

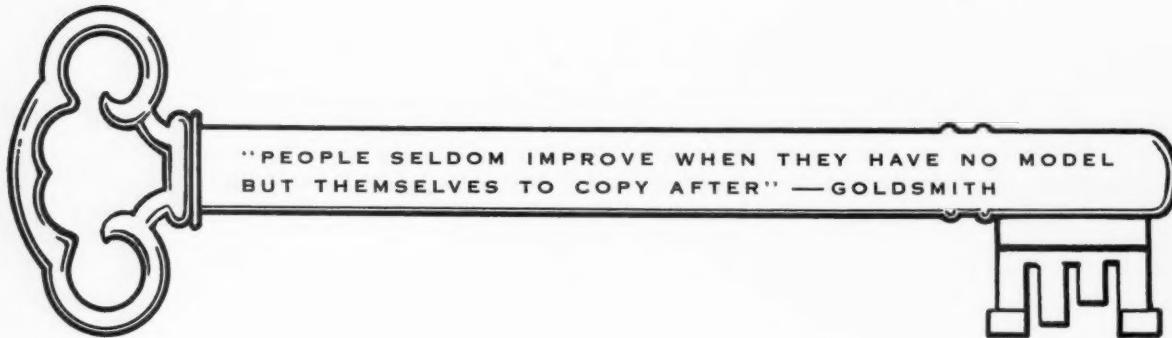
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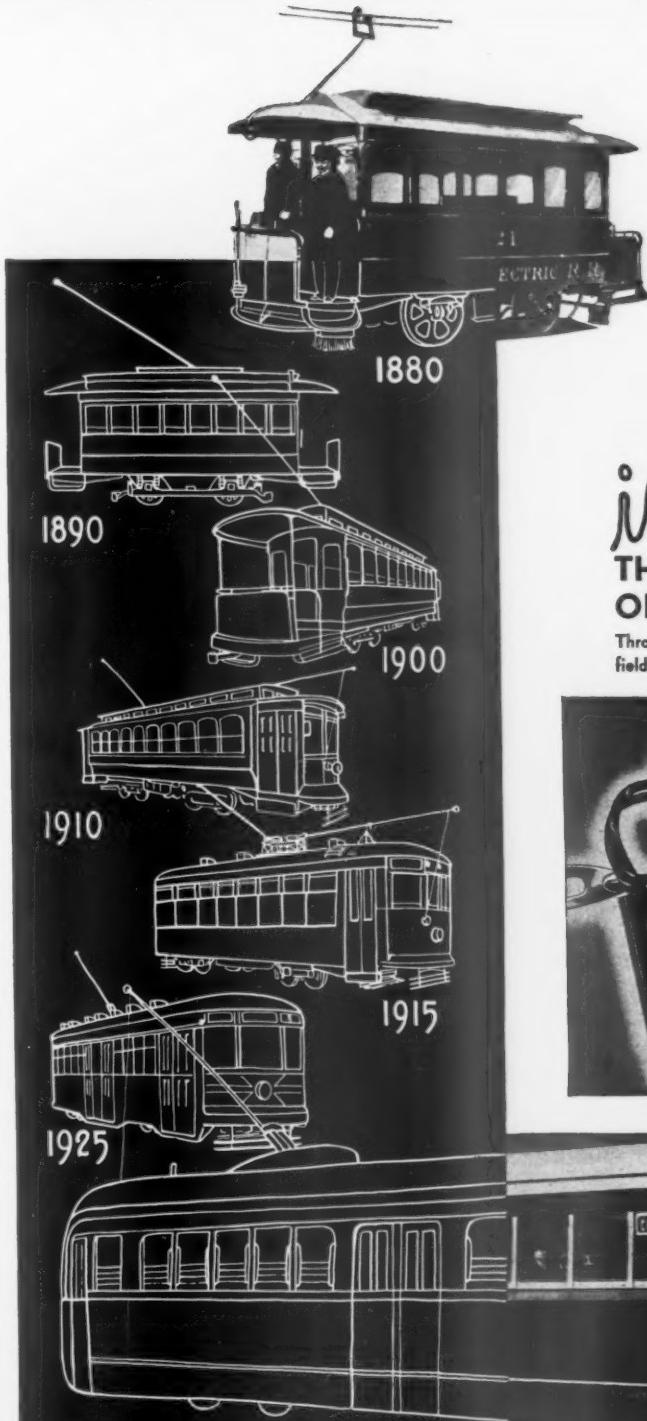
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Number 10

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Silver, by Senator Key Pittman of Nevada.

Mineral Land Withdrawals, by Erskine R. Myer.

Conservation, by John W. Finch.

Slushing vs. Gravity Loading at Climax, by W. E. Romig.

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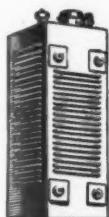


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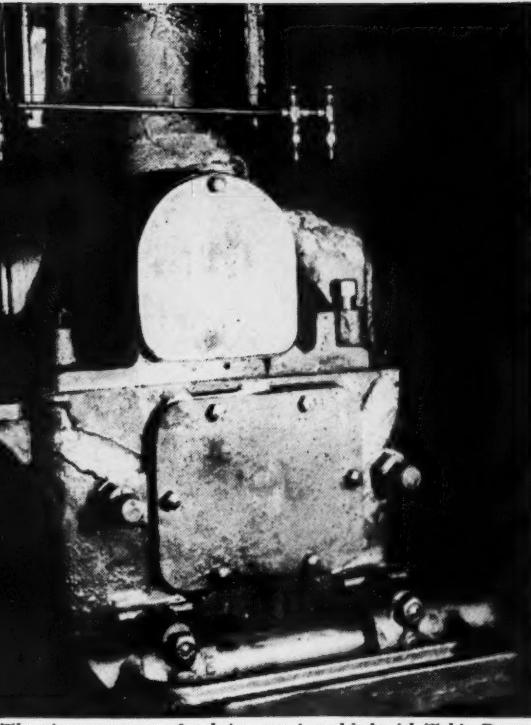
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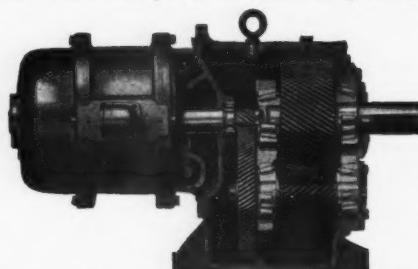
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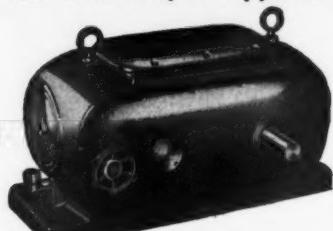
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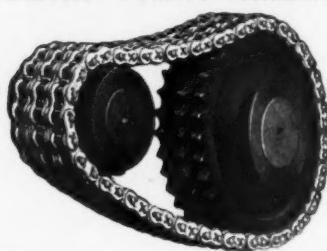
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THE MINING CONGRESS JOURNAL

Wage Levels and Prosperity

HOWEVER much we may command wage level increases, whether from the standpoint of the employer who voluntarily increases his wage payments, or from the standpoint of organized labor which demands better pay as a means of avoiding a threatened strike, we must at all times recognize that every general increase in production costs, whether from increased wages, inefficient service or bad management, necessarily requires a readjustment in the field of consumption.

Earning power and purchasing power must rise and fall together.

It must always be considered that more than 90 percent of consumer costs has already been paid out in wages to some kind of workers. This begins with the miner and the farmer who produce the substances which, through various operations and movements, are finally available to the consumer. Any increase in the cost of raw materials; in transportation charges; in manufacturing costs; in storage, insurance and interest charges; in selling costs, both wholesale and retail; in the merchants' losses through credits, including interest on the money involved in slow credits as well as the losses through creditors who never pay—all these must be paid by the consumer.

The value of the wages of the consumer depends absolutely and entirely on these costs of production, distribution and exchange. If these combined costs, comprising the selling price, become too high, the consumer's wages must be increased or he must reduce his consumption.

When we consider that, by and large, all producers are consumers and all consumers are producers, we can appreciate that within the confines of any country high wages, as expressed in money, are without meaning, and that wages as reflected in purchasing power furnish the real solution of our industrial problem.

This brings us, if we seek benefits for all, to the importance of efficiency in the use of labor, in management, and in large scale production.

A very important phase of this problem is in the control of our own markets either by an import tariff or, more important, through a low production cost which will by itself command such control. Fully 90 percent of our production is consumed at home. Happy are we if able to sell 10 percent of our goods in foreign markets.

When we are able to sell 10 percent of our production abroad we are also able to increase our purchases of imported goods and thus make it possible for debtor nations, who desire to pay, to gradually reduce their indebtedness and to that extent help us to handle the burden of our own public debt.

It seems plain that prosperity does not depend altogether on high wages as measured in money or on shorter hours, but rather on higher efficiency and uniform purchasing power throughout the nation. Every disturbance in cost levels must spread itself over the country before prosperity is to be nation-wide.

Efficient workmen, efficient management, and ample capital must unite to provide high wages, low costs and absorbing consumption. Where these combine, wage levels will adjust themselves to national prosperity.





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The Mining Congress Journal

Vol. 23

OCTOBER, 1937

Number 10

A Journal for the entire mining industry published by The American Mining Congress

A Victory for Coal

"THE COMMISSION FINDS that there is the necessity for the Tennessee Electric Power Company to provide facilities to meet the power requirements of the Nashville area, and that the construction of a steam plant affords the most economical means of accomplishing this purpose and that the Tennessee Electric Power Company should be directed to build a 25,000-kilowatt plant in or near Nashville, Tenn."

With these forceful and decisive words the Railroad and Public Utilities Commission of Tennessee, in a majority decision, recently approved the application of the Tennessee Electric Power Company for permission to erect a coal-burning steam plant for generation of power at Nashville, Tenn., rather than compel the company to purchase hydro-electric power from the Tennessee Valley Authority.

Extensive hearings on the case lasted several weeks, and elaborate testimony was presented by expert witnesses on both sides of the question. Evidence was overwhelming that the company can generate power more cheaply than it can purchase it under rates proposed for the power needs; that it was more desirable that the company own and control its own generating plants rather than be dependent on a contract that could be terminated on five years' notice; that provision for steam plant capacity near the load center insuring constant availability of an adequate and dependable power supply comprises good management; and that public welfare is best served by operation of a steam plant, by insuring greater employment of labor in operating the plant, in producing the coal consumed therein, and in transporting it from mines to plant, and by the consideration that parts of the operating costs of the steam plant return to the public in the form of taxes.

If only more decisions of great import were being made with the studious care and far-sightedness as to what promises ultimately the greatest good for the greatest number of citizens, exemplified by the Tennessee Commissioners, the increased confidence engendered thereby would permit action in industry which would go a long way toward solving many of the perplexing problems which still face the nation today.

Admirable Ethics

IT WAS DECIDEDLY encouraging to read recently that two responsible employees of the Bureau of Internal

Revenue, Morrison Shafrroth, chief counsel, and Judge Russel J. Ryan, his principal assistant, had resigned rather than participate in the Treasury's publicity campaign against large taxpayers charged with tax evasion. In thus forfeiting their jobs rather than furthering a practice which comprised a mere punitive gesture and which evoked a great amount of justified criticism, these men have displayed courage and a standard of ethics to be greatly admired. Doubtless there are many responsible Government officials who recognize the difference between laudatory and decidedly questionable administrative practices, but few are willing to surrender their positions in order to maintain high standards of conduct they have set for themselves.

Sound Progress

NOT SO LONG AGO—a mere five or six years—common thought in the mineral industry was that the year 1929 marked the end of an era in production and demand for its products, particularly the common metals. Production curves, which had risen in geometric progression for several decades, would in the long run taper off to a more level slope, with secondary metal supplying larger and larger proportions of the total demand.

Yet we now witness the spectacle of practical capacity operations throughout the metal mining industry, and rapid progress by the coal industry toward former production levels.

Lake Superior iron ore shipments for the season to August 1 have set a new all-time record, surpassing even the 1929 figure. Recent reports from the Copper and Brass Research Association indicate that consumption of brass pipe and copper tubing in 1937 will surpass the 1936 amount (the previous record year), and that new peaks will also be made in the use of copper and brass by the automobile and air-conditioning industries. The situation in zinc is such that stocks are sufficient for only about a week's supply. Molybdenum and nickel output establish new record levels seemingly each year.

Perhaps 1929 did mark the end of an era of phenomenal expansion; but the years 1936 and 1937 demonstrate that industry, even though burdened by troublesome uncertainties, will forge ahead to new heights of prosperity, will ease decidedly the unemployment situation, and will make possible an ever higher living standard. This is the one and only way that sound progress can be continued.

MINE TAXATION[†]

By W. MONT FERRY *

NO CONVENTION program is complete unless it includes a tax discussion. Frequently these discussions condemn ALL existing tax laws as unjust, discriminative and confiscatory when applied to the industry represented at that particular convention.

It might be assumed that this gathering of mining men representing the Western Division of the American Mining Congress would give a sympathetic reception to a sweeping condemnation of ALL mine tax legislation both state and national. However the assumption is not justified.

Miners are not opposed to taxation per se. Miners are good citizens and recognize the necessity for heavy taxes to meet the exigencies of present conditions. While willingly bearing the burden which in equity must be borne by all industry and all citizens, miners insist and demand that the burden of taxation be fairly distributed, that reasonable stability be established and maintained, and that the truth about this great industry be recognized by our law-makers as a basis for tax laws.

The increase in number and severity of mine tax laws, especially in the several states, is largely due to ignorance of the industry's problems; to an ever insisting demand for "easy money" and to the selfishness of organized minorities and organized tax spenders.

A brief review of some of the fundamentals which form the background of this metal mining business will, it is believed, justify the comments and conclusions which will be presented.

It is necessary to consider this industry as a whole because sound conclusions cannot be reached by citing individual operations.

At the outset the query suggests itself: How important is this mining industry in the national economic set-up?

When coal mining is included—as it should be because more than one-third of the coal mined goes into metal production and fabrication—mining is our second largest industry. It has normally purchasing power of \$350,000,000 per year; it employs about 2,000,000 workers at a high average wage; it vitally affects the livelihood of 25,000,000 of our fellow citizens; it contributes 22 percent of Federal income and furnishes 56 per-

cent of revenue freight to class one railroads.

We may conclude then that mining is a basic and an important industry.

A mine is essentially different from any other kind of property. It reaps a crop which never grows again. When perchance dividends reward the miner, these dividends must include a return of capital as well as profit. A mine can be used only once and all of it cannot be used at one time.

The great risks involved in the business of mining are not understood by our law-makers, much less by the general public. It is true that many mines return substantial rewards; but what of those mines which, while producing a large tonnage of metals, yet operate at a loss? And what of the thousands of prospects—ventures requiring great courage and large expenditures—which never produce anything but shattered dreams?

Consider now the following data compiled by the Bureau of Internal Revenue showing the relationship of profits, losses and total production for the non-ferrous metal mining industry of the United States for a normal year (1926).

	Profitable mines	Unprofitable mines
No. of mines.	383	1,847
Gross value . . .	\$709,432,125	\$411,428,705
Net income . . .	84,930,346
Net loss	33,325,833
Net income for industry	—	\$51,606,513

By numbers, unprofitable mines outnumber profitable mines by five to one. By percentage of gross production, 63 percent of total production (less than 2/3) was profitable and 37 percent (more than 1/3) was produced at a great loss. The net profits before corporate Federal income taxes and personal Federal and state income taxes were deducted represent 4.6 percent of the gross value of the product. After deducting Federal corporate taxes only the net profit on total gross production was 3.6 percent.

Can objection be sustained to a 3.6 percent profit for this great industry in its operations which contributes so largely to the enduring wealth of our country?

Should an inquiry be made as to what becomes of the remaining 96.4 percent of the gross mine dollar it is found that it is spent for labor, material, supplies and in the payment of the numerous taxes other than the straight Federal corporate tax. Material and supplies have been called "canned labor"; hence, by far the greatest part of the gross mine dollar is spent for labor.

Legislators and tax-gathers do not know this, or if they do they utterly fail to properly use that knowledge in formulating mining tax laws.

It may be of interest at this point to call attention to the tax situation of one of the profitable mining operations in Utah. This typical mine pays 13 separate taxes. They are:

Federal Capital Stock Tax
Federal Income Tax
Federal Excess Profits Tax
Federal Undistributed Profits Tax
Federal Old Age Pension Tax
Federal Unemployment Tax
State Property Tax
State Net Proceeds Tax
State Gross Proceeds Tax
State Corporation Franchise Tax
State Unemployment Tax
States Sales Tax
State Use Tax.

The sum of these 13 taxes is equal to more than 30 percent of net taxable income of this mine and it equals more than 53 percent of the total payroll. Otherwise stated, every dollar paid out for labor requires the payment of 53 cents additional for taxes.

When considering mine taxation the mounting costs must not be forgotten. Labor, material and supplies cost more; shorter hours bring about higher costs; social legislation, however meritorious, adds to the financial burden. Because of mounting costs, marginal ore must be neglected and frequently abandoned, never to be recovered; and the development program so necessary to perpetu-

[†] Presented to the Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, September 10, 1937.

* Vice President and Managing Director, Silver King Coalition Mines Company.

ate the industry and the individual producer is curtailed.

Let it be remembered that the miner cannot pass on to the well known consumer these additions to his costs. He must absorb them himself. He can influence neither the metallic content of his ore nor can he establish the market price for his metals. World conditions fix the price of metals.

Contrary to the general impression metal mining is a competitive business. Competition does not exist much, if any, among individual producers nor is it an important factor in so far as markets for metals are concerned. But competition does exist quite definitely among metal-producing areas, particularly those areas situated on different continents and under different political control and differing widely in living standards, degrees of social development, transportation and reduction costs. In short, deadly competition exists among these widely separated mineralized areas based on cost of production.

The non-ferrous metal mining industry of the United States is in grave peril because of foreign competition. Having, as we do, the highest standard of living of any country in the world, with increasing wages and restrictive laws piling Pelion on top of Ossa, the utmost in management and technological skill are required to attempt to keep up with the international procession. Are we here in the United States succeeding in this effort? World statistics, production and costs indicate quite definitely that we are not. Our country is losing its preeminent position in the business of non-ferrous metal mining.

Let our legislators learn these facts and bend their energies toward encouraging the development and utilization of our natural resources, and cease to harass and discourage this great liberal industry by applying to it laws that do not fit its conditions. For mining is a liberal industry. Miners view life from the mountain top and their vision is not restricted. We have no sweat-shop underpaid labor; we do not advocate or practice long hours and grinding work for our employes. We have a care for better housing and improved social opportunities. We know our men, and recognize and sympathize with their proper desire for betterment. Without any aid from the paid agitator we can establish and maintain satisfactory relations between employer and employee.

Specifically, criticism is here made of certain tax laws which do not recognize the peculiar conditions surrounding the business of mining. Leaders of our industry have affirmed again and again that once the value of a mine is approximated by a recognized formula, and tax laws are made and applied on that basis, then no complaint can in justice be made. Federal mine tax laws established in 1913 and subsequent modifications which recognized basic principles are not criticized. But of late enormous expenditures by the Federal Government and by the states—some of them necessary—have brought bigger, if not better taxes, and some strange tax laws are now

on the books with the threat that others will follow.

Consider for a moment the Federal Undistributed Profits Tax: It adds to treasury receipts, it puts a good deal of money in circulation, and it may tend to restrict stock manipulation in the realms of high finance. But its application to our operations is discouraging, destructive and unnecessary. Surplus earnings must be conserved to meet adverse economic conditions. The chaos from which it is said we are now emerging furnishes a striking example of how metal miners use their reserves to maintain employment when men were desperately but vainly seeking some work which would furnish food for their families. These reserves kept many payrolls alive when production was a losing game. The non-ferrous metal mining industry as a whole reduced surplus more than 50 percent. Individual mines completely exhausted money reserves and actually depleted capital in order to keep men at work. Under this undistributed profits tax law these emergency reserves cannot be restored except by the payment of a heavy tax—a penalty, if you please, for providing funds to meet the necessity of our workers. New mining ventures—the development of new mineral areas—are heavily handicapped by this law. Thus the perpetuation of the industry is threatened by this unnecessary and unjust addition to the natural risks of mining. The application of this law sacrifices future returns to the Federal treasury for present and temporary revenue.

The matter of depletion may not be deemed an appropriate subject for comment in a discussion of mine taxation. However, it is so intimately related to the tax question that it should not be neglected when factors affecting costs are under consideration. After all, taxes are costs, and in the last analysis, costs will determine whether or not our industry is to live and thrive. A thorough analysis of this depletion principle so vitally important to all capital consuming industries will be presented later during this session of the convention.

During the last few years some state legislatures have eagerly seized upon the mines as a source of easy money. These raids upon the industry in many cases have been made without understanding the mining problems and without consideration for the effect upon the industry and upon the economic structure of the states themselves.

Little attention is paid to the proper valuation of mines as compared to the valuation of other taxable units. This, of course, is fatal to just taxation.

Classification of mines for taxation purposes is suggested, with the imposition of higher rates on more profitable individual mines. This principle will not stand analysis. The classification can be and has been stretched and distorted to a degree that makes it clear that money and not justice is the objective sought.

The tax on gross mine income which has been enacted by a number of State legislatures, is a vicious and destructive

tax. The principle is uneconomic, especially as applied to mines; and since the rates are subject to change by any session of the legislature, stability has "gone with the wind." It is bad enough when applied to profitable mines, but when applied to mines producing substantial tonnages of ore but without one thin dime of profit, this law is destructive to the last degree. It is a red light to all capital, warning it to keep out. It affects adversely mining and marketing marginal ore; it curtails development and discourages prospecting; it definitely reduces employment and is destructive to the welfare of the states' population, so many of whom are directly dependent on this industry for their livelihood, especially in these mining areas.

What now may be concluded from the foregoing presentation?

The whole matter of justice or injustice of any given mine tax law revolves around the answer to the question "Does it fit the singular and unusual nature of the non-ferrous metal mining industry?" Moreover, knowledge of what becomes of the gross mine dollar, and what a small percentage of that dollar represents profit to the miner, will simplify and clarify many perplexing phases of mine taxation.

Broadly speaking, mining is not strictly a business. It is a magnificent venture which holds out to those hardy souls who undertake it the same hope which in ancient times led Jason and his Argonauts to seek the Golden Fleece. It is the same hope which animated those adventurers who rounded the Horn, crossed the Isthmus and braved the hardships of mountains and deserts "in the days of '49." Big rewards for the few, failure for the many.

Let our legislators consider the admonition of the Hebrew prophet: "Thou shalt not muzzle the ox when he treadeth out the corn."

Louisiana May Reduce State Sulphur Tax

Intimation that official action in response to growing public sentiment may soon be taken in Louisiana to relieve the existing tax burdens on the state's sulphur industries was recently given by A. B. Patterson, chairman of the State Board of the Department of Industry and Commerce, in a letter to Langbourne M. Williams, Jr., president of the Freeport Sulphur Company.

Mr. Patterson's letter was a formal request that the company consider resumption of its \$300,000 construction program at Port Sulphur and restoration of production to levels achieved prior to July, 1936, when the state severance tax on sulphur was increased to \$2 a ton from 60 cents.

Output of sulphur in Louisiana was reduced 23 percent after the \$2 tax rate became effective last year, as compared with an increase of 37 percent in Texas. Lowering of the Louisiana tax, however, would automatically result, it is believed, in a higher rate of production.

The Money System of the Future[†]

By RENE LEON *

In ASKING ME to come to your convention, your secretary wrote me that you were particularly interested in the future status of gold. Right here let me say that your concern is shared by a majority of the thinking people of the earth in and out of the mining industry.

As you know, my sole interest in the so-called precious metals arises from their usage in the money systems so that, as a money and exchange man, I could not fail to include gold in any consideration of the money problem. There can be no doubt as to how I stand on fundamental monetary principles; my opinions, right or wrong, have been uniformly consistent and freely spread upon the record over a period of years. Yet, for some reason best known to them, certain persons, in and out of public life, have on occasions been sufficiently uninformed or sufficiently uncharitable to suggest that my opinions were not wholly disinterested. Here and now is as good a place and as good a time as I can think of publicly to set at rest, once and for all, any such silly surmises. The members of the American Mining Congress here assembled are in the best position to know whether or not I have any affiliation with their industry, so I shall take them to witness. I am a money changer, and I offer no apology for my profession which needs none because money changing is an integral part of the system of distribution and exchange. Money changing and short-changing should not be confused. I have hired out my services in the past, but my opinions never. So much for that, and now as to gold.

Last May I made an address in my home town of Princeton on the subject of gold. In my introductory remarks I spoke as follows: "The popular approach to the gold problem is whether we shall maintain, reduce, or increase the price of gold. While opinions differ and counsels divide on the desirability and degree of action or inaction in this particular, belief prevails that it is the status of gold that will determine the trend of prices and the future of our economy.

[†] Presented to the Annual Metal Mining Convention, Western Division, The American Mining Congress, Salt Lake City, Utah, September 7, 1937.

* Munds, Winslow & Potter, New York City.

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EDITOR'S NOTE: So urgent were requests for prompt publication of the addresses on monetary matters delivered at the Salt Lake City convention that the Journal is pleased to present Mr. Leon's paper herewith. Probably many mining men will not concur with all of the ideas expressed by Mr. Leon, which are, of course, his own and do not necessarily reflect opinion of the American Mining Congress. The splendid address made by Senator Pittman on "Silver" is now being edited by the author and will be carried in full next month.

+ + +

To approach the problem from any such angle is to flout reason and logic, both of which deny that the prosperity of a great nation could endure if it were solely predicated on the vagaries of any metal, however precious. The future of our economy does not depend on a given number of grains or pennyweights of metal, but on the nature and human resources of the nation; and to attempt to lend magic and power to dead weight, whatever its substance, is to practice fetishism in the twentieth century. This does not signify that gold can have no usefulness, because history proves that it can; but that depends upon whether or not we can agree on some system which, by utilizing gold, will endow it with a usefulness which it does not otherwise possess."

This, gentlemen, is, in my estimation, the crux of our present problem; can we agree on some money system which, by utilizing gold, will endow it with a usefulness which it does not otherwise possess. I, for one, am convinced that we can agree, and I believe that the time is not far distant when those two nations which represent a substantial numerical element of the earth's population and which, combined, constitute an overwhelming proportion of the world's economic power, will finally come together and agree on a money system which will definitely fix the status of the precious metals in the economic scheme.

Because their very existence depends upon it, England and America must come to an agreement. The question is what will this agreement be? Whatever it may turn out to be, if it is sound it will endure and if it is unsound it will not endure. Hence it behoves every citizen to subordinate his own immediate interests to the broader significance of the problem, that enlightened public opinion may support, and even guide, eventual action when agreements are discussed. What is to be the money system of the future? If you will bear with me a few moments I will give you my conception of it.

Any money system, to be workable, must inspire the confidence and satisfy the needs of those it would serve. Therefore, if the present day means of communications and transportation make of the world we live in an economic unit, we must reject as unworkable any money system which aims at national self-containment. If we accept the principle that money is essentially the auxiliary of trade, we must reject as unsound any money system which subordinates trade to the needs of money management. And finally, to borrow the apt phrase of an eminent student of the subject, "If we are to develop an economy of abundance, we must reject any scarcity system of money."

Provided the foregoing reasoning is sound, it remains for us to unite by international agreement on the choice of a common denominator which shall serve as an adequate means of exchange, as a stable measure of value, and, at the same time, by enabling a majority of nations to link their units of currency thereto, serve the needs and promote the expansion of trade at home and abroad. To be adequate the instrument of exchange must be free to function. If it is to be a relatively stable and accurate measure of value, its volume must bear a reasonable relation to the volume of wealth it would measure. And finally, if a majority of nations are to link their units of currency to a common denominator, its substance must be such as to be acceptable to a majority of the peoples concerned.

The metallic system of money has endured throughout the ages because,

despite their purely theoretical value, the so-called precious metals partly represent the value of the labor of those who produce them. As distinct from the product of the printing press which, by whosoever utilized, none the less remains an instrument of larceny, because the values it creates are fictitious, the precious metals so-called are universally regarded and accepted as "sound money" because they possess a labor value.

Because the breakdown of the Gold Standard was chiefly due to its quantitative deficiency is no reason to abandon the metallic system altogether, particularly in the absence of a better one. The very recognition of a deficiency suggests the means for correcting it on the principle that accurate diagnosis is half the cure. While precious metals are non-essentials, it does not follow that in coining them into money a purely arbitrary price may be fixed upon them, because all the products of man's labor, essentials or non-essentials, are supposed to bear a reasonable relation to the value of the labor involved in producing them. This principle applies to that commodity which is chosen as the very corner stone of the price structure more than to any other, because that corner stone will impart its soundness or its lack of soundness to the entire price structure, and thus either firmly support it or inevitably undermine it.

When, in 1816, Great Britain first adopted the gold standard and fixed a price of 84½ shillings (\$20.97) for a fine ounce of gold, that price was not arbitrary. It was arrived at by figuring the cost of gold production plus a fair profit to the producer. When, in 1696, exactly two centuries before William Jennings Bryan's advocacy of bimetallism, Sir Isaac Newton, then Master of the Mint, recommended to his Queen a price ratio of 16/1 silver to gold, he did not arbitrarily fix that figure; on the contrary, he determined it by recognizing that 16/1 was the natural production ratio of the two metals over a long period of years. Today's price of \$35 per ounce of gold bears no reasonable relation to the cost of its production; it is arbitrary in the extreme and constitutes an unwarranted enrichment of a special class at the expense of the community. It is a fictitious value temporarily created by the wholesale hoarding of available metal which accompanied the post-war collapse of world economy. As dehoarding and production increase we shall inevitably be forced to lower the price of gold or continue to sterilize it in increasing amounts and at public expense, under penalty of witnessing the skyrocketing of our general price level. If the latter ensues we shall find ourselves exactly where we started, with the same inadequate quantitative relation of gold to other forms of wealth, so that the scarcity system of money will have prevailed despite currency devaluation.

The devaluation of currencies in terms of gold in no wise affects the status of the yellow metal itself except in its relation to currencies. Gold's quantitative relation to all other commodities remains



Rene Leon

unaltered, and whether we fix a price of \$20.67, \$35, or \$50 to an ounce of gold, it still remains 1 oz. of gold. The quantity principle will ultimately assert itself by the readjustment of the price structure to existing quantities, and we shall suffer from precisely the same evils of quantitative deficiency regardless of the difference in the level of prices. Without the necessary food a man can starve just as completely on the top floor of a building as on the ground floor. If it is followed by a doubling of prices, the doubling of the volume of currency returns us all to our point of departure with this important difference, however, that all holders of fixed income securities will have been mulcted in the process.

What we seek is a reasonable stable money system; one which will free us from recurring inflation and deflation of prices due to purely monetary causes; yet in a world which is not static absolute stability is impossible of achievement. However, it does not follow that we cannot achieve comparative stability if we devise a system which will provide an adequate quantitative relation between the volume of money and the volume of wealth that money would measure. Why acknowledge the immutability of the quantity principle and then fail to apply it to our direct need? The fact is that counsels divide and agreements fail on the very question of the kind of money which shall go to make up the missing though indispensable volume of real money needed in the system if it is to function. As a measure of value and as a medium of exchange, metallic money is but a counter—but it is something else as well; for were it

only a counter, then one kind of counter would do as well as another, and a small factory could turn out counters in sufficient quantities to wreck any price system we chose to predicate upon them. Obviously we need the type of counter which cannot be turned out at will; the kind upon which we can fix a value closely approximating the cost of its production; the kind which, in short, has a labor or real value. Gold provides us with an ideal substance for the coining of money, but its volume is inadequate as evidenced by the breakdown of the Gold Standard. How then shall we improve the gold standard? What commodity shall we choose to complement it? What commodity can we choose that possesses a labor or real value and to which we could safely impart legal gold equivalences? If it isn't silver—what is it?

Those who oppose bimetallism must supply us with the answer to this riddle. Of course, they will contend that bimetallism has been tried and has failed; but the fact is that bimetallism has never been tried. Bimetallism essentially implies a fixed ratio, not different ratios, between silver and gold, and the chief trading nations never fixed a single ratio. When England and the United States adopted a ratio of 16 to 1, the European continent fixed one of 15½ to 1, with the result that the system naturally broke down. Were the ratio of shillings to the pound to be fixed at 21 shillings in Scotland and 20 shillings in Wales, the British system would inevitably collapse. Were the United States to fix a ratio of 105 cents to the dollar in New England and 100 cents to the dollar in the Middle West, the American money system would also break down. That is precisely what happened to so-called bimetallism in the nineteenth century. Owing to the disparity of ratios it became advantageous to ship silver from Great Britain to the Continent for the payment of debts and, conversely, it was equally profitable to send gold in the opposite direction. This resulted in the concentration of gold in Britain and in its scarcity on the Continent of Europe, so that Britain, then the most important creditor nation, sensing her advantage, adopted the single gold standard and, by extending credits abroad in terms of a metal abundant at home but scarce elsewhere, she commanded foreign goods and services at exceedingly low prices when expressed in terms of British currency. In due course the Continent strove to correct this condition by also adopting the single gold standard. While the disparity was thus corrected, the scarcity system was also established. The great blunder was committed of demonetizing silver with the result that the world was ultimately plunged into cruel depression because the price system was since made to depend upon the vagaries of a single metal. Instead of correcting the blunder, the world attempted to meet gold's deficiency either with worthless paper or with coin so debased as to be practically worthless. Under the guise of seigniorage

(Concluded on page 55)

Wheels of Government

As viewed by A. W. Dickinson of the American Mining Congress

A DISGRUNTLED Congress came to a close on the evening of August 21. There was none of the hilarity and goodfellowship which has normally marked the close of previous sessions. The military band which had been provided to cheer the departing representatives of the people was sent back to quarters by the Speaker of the House as he apparently realized that his colleagues were in no mood for goodtiming. The differences which had arisen during the session over the legislative program could not be so quickly forgotten, and in some quarters there was bitterness which will still be apparent when Congress next convenes. Wide divisions have occurred over the Supreme Court issue, and the South and Southwest are almost a unit in determined opposition to the attempts of the administration counselors to inflict revolutionary wage-hour legislation upon the nation. These counselors, coming as they do from congested urban areas, apparently fail to realize that industrial enterprises throughout the nation are widely different and that a blanket Federal control of wages and hours is impractical, and difficult if not impossible of administration. Threats of reprisals against members of Congress who opposed the administration program will not be forgotten and it is a well recognized fact that a threat to oppose a Congressman in his own district will arouse the maximum of resentment.

Wage-Hour Bill

The Southern Congressmen stood like a rock in opposition to enactment of the Black-Connery Labor Standards Bill. After passing the Senate and being reported by the Labor Committee of the House it was held in the Committee on Rules by a vote of 8 to 6 against reporting the measure to the floor of the House for a vote. While the determined opposition of western and other members of the Congress had brought about an agreement to strike the harmful "graveyard shift" provision from the bill, the objection in the House was so strongly against the measure that an attempt to bring it to a vote on the floor by means of a majority caucus failed. The members of the majority either did not attend the caucus or else if present they

would not vote—and the bill remained in the Committee on Rules.

It has since been announced that the proponents of the legislation are drafting two bills for introduction at the coming session. One bill is similar in nature to the original Black-Connery measure. The other is to provide for Trade Practice Agreements by industries; these agreements to be drawn under the guidance and with the assistance of the Department of Commerce and to be approved—and policed—by the Federal Trade Commission and the Department of Justice. Thus we have another approach to the purposes attempted in the late NIRA.

Tax Legislation

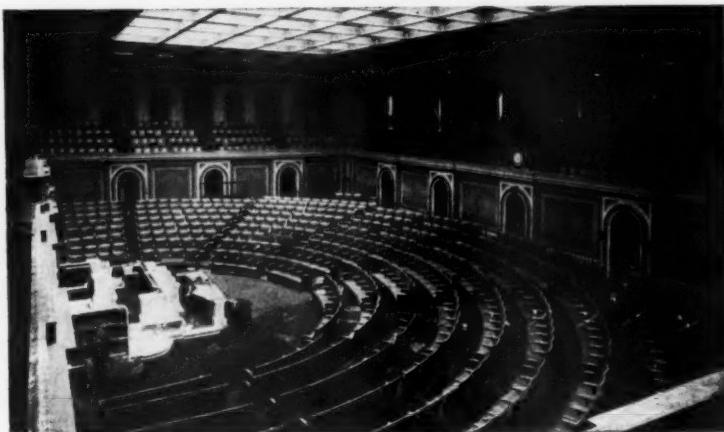
The report of the Ways and Means Committee on the Revenue Bill of 1937 was accepted on faith by a tired Congress and the measure passed both houses with a minimum of debate and almost no change. The entire bill was an attempt to correct losses in revenue under the practices followed by certain individual taxpayers. The bill as written included under Section 353, Personal Holding Company Income, the royalties from mineral, oil, or gas production in "personal holding company gross income." The Finance Committee of the Senate corrected this situation in part by placing an amendment in the bill which excludes mineral, oil, or gas royal-

ties from personal holding company gross income if they constitute 50 percent or more of the gross income of the corporation. It is required under this exemption that the amount allowable for the taxable year for expenses (under Section 23a) must constitute 15 percent or more of the gross income. Compensation to shareholders for personal services is not to be counted as part of the 15 percent. In discussing this amendment the Finance Committee report states:

"This amendment will not exclude royalty income if it constitutes less than 50 percent of the gross income, and it is believed that the 15 percent expenses requirement will furnish a satisfactory separation between companies which may be classified as operating companies and the pure holding company type."

The bill became law in this form and is more reasonable in its treatment of the mineral producers than when it passed the House.

At the close of the recent session a subcommittee of the Committee on Ways and Means was appointed to sit and act, and to hold such hearings as the committee may determine in the preparation of a bill or bills relating to internal revenue taxes. This committee is scheduled to meet about November 1. The personnel as appointed:



Democrats

Vinson (Kentucky)—Chairman
 Cooper (Tennessee)
 McCormack (Massachusetts)
 Disney (Oklahoma)
 Buck (California)
 Duncan (Missouri)

Republicans

Crowther (New York)
 Reed (New York)

It is the committee's job to prepare the Revenue Bill of 1938 with its much talked-of revisions. The task is terrific and the committee is rather expected to follow the precedent of 1933 when the preparations were in the making for the Revenue Act of 1934. At that time the Ways and Means Subcommittee worked through the fall and brought in a report which was given to the Treasury and upon which the Treasury prepared a statement. When the Congress convened both report and statement were made public and hearings before the committee followed. The Treasury report and recommendations for rewriting the revenue laws are due at an early date, but may not be made public at this time. It has been indicated recently that the coming revisions in the law may be amendments of a specific nature intended to treat certain needs rather than a general overhauling of the whole structure. Definite consideration is being given to the undistributed earnings tax and the capital gains and losses provisions of existing law, and percentage depletion will undoubtedly be the subject of special attention.

Stream Pollution

The Senate passed the amended Vinson stream pollution bill in the last days of the session and it was sent to the conference committee with the five harmful Lonergan amendments embodied in the text. The conferees met twice and were unable to agree and the bill stands in

this status at the convening of the next session. The House conferees are reported to have stood solidly for the Vinson Bill in the form in which it passed the House. The coming session may see a serious situation in water pollution legislation. The mineral industries have stated to the committees of Congress that stream pollution is a local problem to be worked out in accordance with conditions existing in individual states where it occurs. The industry looks with extreme disfavor on the creation of any Federal bureau to administer any regulatory stream pollution measures of the Lonergan type.

Silver Prices.

During the past month announcement was made by the Treasury that the Government will pay the present price of 77.57 cents per ounce for silver produced prior to December 31, 1937. Refiners with large stocks of silver in process were concerned and were not in a position to know what to pay producers for their ore and bullion. The flurry was caused by the coming expiration of the President's proclamation of 1933 which authorized the present price for silver. The Silver Purchase Act is a continuing law and no drastic change in the purchasing of domestic silver is anticipated.

Unemployment Survey

The Black unemployment census bill passed by the last session has been the subject of administrative plans during the past month. In signing the bill the President made it clear that the count is to be purely voluntary and that no one is required to register. At present, plans are being worked out to have a day set some time this fall for the registration of unemployed and partially unemployed. The law calls for a final report of the results of the count by April 1, 1938. As the proposal now appears there is considerable skepticism as to the value of the results to be obtained from this voluntary registration.

Bituminous Coal Commission

Work is proceeding toward the establishment of prices for the coal industry, and the drive is now on to set the minimum prices by the middle of October at the latest. Meetings and hearings scheduled up to October 7 are all designed to hasten the desired objective. The problems are complex, but a real effort is being made; and with contracts of over 30 days prohibited by the Commission at the present time the industry is intensely interested in the forthcoming publication of prices.

The following tentative weighted average costs have been published by the Commission:

For Area No. 3 (Alabama, parts of Georgia and Tennessee)	\$2.57
For Area No. 4 (Arkansas, part of Oklahoma)	3.87
For Area No. 5 (Kansas, Texas, Missouri, part of Oklahoma) ...	1.94
For Area No. 6 (Colorado and New Mexico)	2.63
For Area No. 7 (Wyoming and Utah)	2.37
For Area No. 9 (Montana)	2.04
For Area No. 10 (Washington and Alaska)	3.35

Special Session

As the President's special train bore on through the farming states the indications carried by reports from those on board to the press of the country showed more and more that an early session of Congress is to be called. November 15 is named as the probable date and the subjects for treatment are given as wage-hour bills, agricultural aid and some form of conservation of natural resources. If the call is issued for a special session it should make possible an early adjournment date for the regular session next spring and permit candidates in the Senate and House who seek re-election to return home for summer campaigning.

California Mineral Production for 1936

Compilation of the final returns from the mineral producers of California for 1936 by the statistical section of the Division of Mines, Department of Natural Resources, under the direction of Walter W. Bradley, State Mineralogist, shows the total value for the year to have been \$327,804,268, being an increase of \$64,399,951 over the total of 1935 which was \$263,404,317. There were fifty-eight different mineral substances, exclusive of a segregation of the various stones grouped under gems; and all fifty-eight counties of the state contributed to the list.

As revealed by the data following, the salient features of 1936 compared with the previous year, were: All groups such as fuels, metals, structural material, industrial minerals, and salines show a marked increase in total value. Of the individual mineral products, petroleum showed the greatest increase in value and output, followed in turn by miscel-

laneous stone, cement, gold, borates, potash, natural gas, silver, brick and hollow building tile, soapstone and talc, granite, silica. Those showing decreases in total value were coal, chromite, mineral water, salt, sandstone.

Of the fuels, petroleum showed an increase in value of \$32,331,874 and an increase in amount from 205,979,855 barrels to 214,776,227 barrels of crude oil. The average price received for all grades of crude oil was an increase over that received in 1935. Natural gas showed an increase in value with a slight decrease in amount from 302,447,193 M cu. ft. worth \$17,680,661 to 298,922,708 M cu. ft. valued at \$18,585,970.

Of the metals, the gold output increased from 890,430 fine ounces to 1,077,442 fine ounces and in value from \$31,165,050 to \$37,710,470. Silver increased from 1,191,112 fine ounces worth \$856,112 to 2,103,799 fine ounces worth \$1,629,392; copper from 2,031,836 lbs. worth \$168,645 to 9,991,799 lbs. worth \$919,245, with quicksilver, lead, tungsten,

and iron also showing increased value; zinc and chromite were the only metals to show decreased values.

Of the structural materials, cement increased in amount and value from 8,086,292 barrels worth \$10,120,721 to 13,300,188 barrels worth \$18,314,589; miscellaneous stone from a total value of \$5,571,041 to \$16,575,238; brick and hollow building tile from a value of \$1,855,343 to \$2,240,905. Increases were also registered by granite, lime, marble (onyx and travertine), and slate. Magnesite and sandstone showed decreases in value.

In the industrial group, the total value increased from \$4,618,588 to \$5,236,534, with most of the important mineral products therein showing increases; noteworthy were pumice and volcanic ash, silica, talc and soapstone.

The total value of the saline group increased from \$9,700,802 to \$12,416,349 with all the larger products showing an increased value with the exception of salt.



Part of the crowd attending the session devoted to Monetary Problems, showing Senator Pittman addressing the gathering.

SALT LAKE METAL MEETING GREAT SUCCESS

FOLLOWING his visit to Salt Lake City back in the '60s, Mark Twain may have questioned "whether a state of things had existed there or not"; but to the 1,800 mining men and accompanying ladies who congregated there September 7-10, 1937, to attend the Annual Metal Mining Convention and Exposition of the American Mining Congress, there was no doubt whatsoever that they were witnessing the largest and most successful meeting of its kind ever held. Benefiting from its ideal geographic situation, as well as its scenic, historic and other charm, mining leaders from all points of the compass, including many coal mining officials, swarmed into the city and taxed accommodations to the bursting point.

The convention sessions, held in the Minerals Building at the State Fair Grounds, were well attended throughout the week, attesting to the keen interest in the excellent program of papers arranged under the leadership of Guy N. Bjorge, national chairman of the Program Committee. Even standing room was at a premium during several of the sessions, although the meeting hall had seats for over 400. Keen interest was displayed by visitors in the splendid array of exhibits planned and assembled by some 85 of the foremost manufacturers of mining equipment and supplies, and by important mineral producing states. Entertainment during the entire week at the principal functions was most pleasant and enjoyable, the only difficulty having been trouble in accommodating the unprecedented crowds seeking admittance upon short notice.

Trips to mining districts and metal-

urgical works during the two days following the convention proper were planned and conducted with excellent precision, and proved highly educational to the large numbers in attendance.

Even Dame Nature smiled happily on the gathering, furnishing perfect weather throughout the week. Storms which threatened the open-air entertainment at the Country Club and the barbecue circled obligingly to allow the show to go on. All in all, visitors left at the end of the week thoroughly satisfied with every phase of the meeting; and each and every person who contributed to the success of the undertaking is to be warmly thanked and congratulated. Oscar N. Friendly, chairman of the Western Division for 1936-37, and official host to the convention; A. G. Mackenzie, secretary of the Utah Chapter of the American Mining Congress; W. J. O'Connor, chairman of the General Committee on Arrangements; J. W. Wade, chairman of the Hospitality Committee; James Ivers, chairman of the Entertainment Committee; E. A. Hamilton, chairman of the Dinner Committee; J. D. Shilling, chairman of the Exposition Committee; J. O. Elton, chairman of the Tours Committee; and George W. Snyder, chairman of the Publicity Committee—all these, together with the hundreds who worked with them, share these honors. Collaborating with the men, and perfecting and carrying out the fine program of special entertainment for the hundreds of ladies at the convention, were various committees of Salt Lake women headed by the following: Mrs. W. Mont Ferry, general chairman; Mrs. Burt B. Brewster, chairman of the Publicity Committee; Mrs. A. G. Mackenzie, chairman of



Guy N. Bjorge
National Chairman, Program Committee

the Information Committee; Mrs. James Ivers, chairman of the Transportation Committee; Mrs. Oscar N. Friendly, chairman of the Reception Committee; Mrs. W. R. Landwehr, chairman of the Tuesday Luncheon Committee; Mrs. E. A. Hamilton, chairman of the Wednesday Breakfast Committee; Mrs. James W. Wade, chairman of the Annual Banquet Committee; and Mrs. R. A. Pallanch, chairman of the Friday Luncheon Committee. Mrs. Frank M. Gray was responsible for many of the lovely flowers and fruit decorations. The Walker Bank and Trust Company cooperated in many ways and furnished the flowers for the head table at the annual banquet. Salt Lake City lived up to and even surpassed the highest traditions of western hospitality.

The Sessions

Tuesday Morning.—The convention was officially opened on Tuesday morning by Julian D. Conover, secretary of the American Mining Congress, who expressed the gratification of all present at the opportunity thus afforded of meeting in the heart of one of the greatest mining and smelting centers in the world. Mr. Conover referred to the noteworthy part which the mining industry of the inter-mountain region has played, both in advancing the general science of mining and in furnishing the metals so essential to our industrial civilization; he spoke of the growing appreciation on the part of the public, not only in this region but throughout the country, of the value and importance of the mining industry to the country's welfare. He then introduced Mr. Robert Linton, consulting engineer, of Los Angeles, Calif., as presiding officer of the first session.

The first paper, on "MINERAL LAND WITHDRAWALS," was presented by Erskine R. Myer, attorney-at-law, Denver, Colo. Mr. Myer emphasized the independent nature of the mining industry, particularly the metal mining group, and traced the history of the various Federal leasing acts. The importance of the policies involved in these acts in developing the West was strikingly portrayed, following which he outlined forcefully the pitfalls which would result from recent proposed changes in the policy. He concluded with a concise sketch of the conservation issue, the chief reason presented for a change in the leasing laws. He pointed out the confusion existing in the real meaning of this term, indicated that mining is not necessarily a "one-crop industry" because of reuse of metals, and showed advantages of a large store of metals above ground in use rather than locked up underground.

Discussion was presented by Dr. John W. Finch, director of the United States Bureau of Mines, who explained the attitude of the Federal Government toward conservation, pointed out the necessity of prudent use of wasting mineral assets,

and pleaded for increased efficiency through consolidation of conservational activities in the Department of the Interior. If mining and forests were administered under the same department, for example, it would not be necessary for a mine operator wishing use of water to negotiate with four or five departments. Much simplification would thus result. Julian Boyd, consulting mining engineer of Los Angeles, urged the Mining Congress to go on record as unalterably opposed to further land withdrawals, and submitted a resolution to this effect. J. J. Beeson, Salt Lake City mining geologist, termed the proposed leasing plan socialistic, and denied that miners are destroying a natural resource. George R. Wickham, of Los Angeles, upheld previous statements in opposition to changes in the leasing law and urged mining men to express their views on this matter to their Congressmen.

"STREAM POLLUTION AND THE MINING INDUSTRY" was then presented by Robert M. Searls, counsel, Newmont Mining Corporation. He outlined pending legislation as it concerns mining, and urged vigorous opposition to the Lonergan amendments to the Barkley bill, designed to inaugurate bureaucratic Federal control over streams. Realizing that constructive plans to cure the evil must be presented, he urged the advantages of handling the problem locally, and cited as an example of splendid local solution of the problem the cooperation recently worked out between miners and sportsmen in California.

Francis A. THOMSON, president, Montana School of Mines, followed with the paper "BUILDING ROADS TO PROSPECTIVE MINING AREAS." He described the development of transportation methods in getting materials and products to and from mines, and pointed out the importance of motor transport to present-day isolated mines. The need for better roads was emphasized, and unsuccessful efforts to obtain Federal allotments for such work were outlined. He cited detailed objections which had been raised by the Department of Interior, and saw little chance of success until that de-

Speakers



Erskine R. Myer



John W. Finch



Carl Trauerman



Francis A. Thomson



Robt. M. Searls

Speakers



Donald E. Cummings



Rene Leon



Wm. Koerner

partment modified its attitude. He urged a more liberal attitude by Government officials on this important problem.

Discussion of the paper was given by Carl J. Trauerman, president of the Montana Mining Association, who cited the temporary character of most relief work, compared with the possibility of permanent employment of relief labor used for building roads to mines in the mining operations themselves when they were opened up. He also urged the formation of a Federal Department of Mines.

Tuesday Afternoon.—With the meeting hall jammed to the bursting point, the intense interest of metal mining men in monetary matters, the subject of the discussions at this session, was strikingly apparent. D. D. Moffat, vice president and general manager of the Utah Copper Company, presided.

Rene Leon, of Munds, Winslow and Potter, New York City, presented his views on "THE MONETARY SYSTEM OF THE FUTURE," which embodied a strong plea for international agreement on a bi-metallic base. He also ventured his own opinion that the present gold price had no economic justification and would have to be reduced to avoid serious inflation. His paper in full is carried elsewhere in this issue.

The subject of "SILVER" was then discussed in detail by Senator Key Pittman, of Nevada. He made a strong plea for the use of silver in the monetary system, agreeing with Mr. Leon on this point. He did not agree on the necessity of a lower gold price, presenting arguments that the \$35 price was justified. He pointed out the importance of the Silver Purchase Act to the monetary structure of the country and the need of continuing its policies which react to the welfare of the western mining industry.



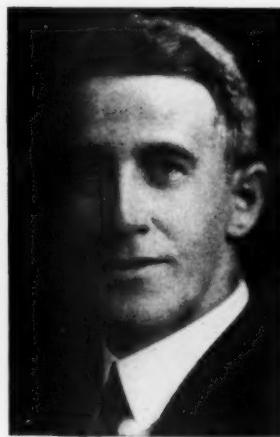
Senator Key Pittman

Wednesday Morning.—Presiding at this session was P. G. Beckett, vice president, Phelps Dodge Corporation. Donald E. Cummings, director of field activities, the Saranac Laboratory, discussed "DUST ELIMINATION IN MINES," which embodied a strong plea for medical control and supervision, along with present work in reducing the dust hazard in mines. He pointed out varying susceptibilities of individuals, the inhibitive effect of certain substances such as gypsum and coal when mixed with dust, and described the use of respirators and other equipment in minimizing the hazard.

Discussion of this paper was presented by William B. Daly, manager of mines, Anaconda Copper Mining Company, who outlined important accomplishments in the Butte mines in reducing dustiness. He emphasized that in approaching the problem it is far better to eliminate dust than to require the miners to wear masks, and cited figures showing that dust counts in the Butte mines were now so low that no hazard existed.

A. S. Richardson, ventilation engineer, Anaconda Copper Mining Company, presented a paper on "AIR CONDITIONING FOR THE VENTILATION OF THE BUTTE MINES," which comprised a detailed discussion of recent installations which have proved effective at Butte in cooling the mine air by using circulating water or brine as the heat transfer medium. His paper in full appears elsewhere in this issue.

Discussion was presented by William Koerner, general manager, Magma Copper Company, who told of conditions requiring the recent air conditioning installation at Magma, costing \$94,000. Since it has been in use for only six weeks, he was not yet able to produce data on the increased efficiency of mine labor caused thereby. Technical features of the system were presented by C. B. Foraker, ventilation engineer for Magma. J. F. Kooistra, representative of the Carrier Corporation, outlined three general types of air conditioning, and emphasized that installations are made be-



H. B. Fernald

cause the results produced therefrom pay in the form of increased efficiency of workers. He cited the increase of 12 percent of tonnage hoisted at the Robinson Deep Mine in South Africa through air conditioning, which also added 7½ years to the life of the mine.

Wednesday Afternoon.—Presided over by Jesse F. McDonald, governor, Colorado Chapter, American Mining Congress, this session was devoted exclusively to discussion of the securities act as affecting the mining industry.

A paper on "APPLICATION OF SECURITIES ACT TO THE MINING INDUSTRY," by J. D. Ross, member, Securities and Exchange Commission, was read by Harold L. Neff, director of the Division of Forms and Regulations for the Commission. The theme of this paper was to the effect that the information required for registration of new securities issues is only reasonable and fair, and is designed solely to give the prospective investor essential facts on which to base his decision. The newly prescribed mine form was analyzed in detail, and the pertinency of each statement required therein was thoroughly explained.

A round-table discussion of the paper was opened by H. B. Fernald, of Loomis, Suffern and Fernald, who stated emphatically that information required by the Commission frequently leads to over-emphasizing immaterial and irrelevant details, confusing to the one making the return. He criticized administrative features rather than primary objectives of the act, and indicated his strong belief that the value of the past was greatly over-emphasized and that the future was not given enough weight. He suggested that the most serious question before the investor today is the future policy of the Federal Government, involving the possibility of endangering securities through Government regulation of the industry involved. Bliss Moore, president of the Northwest Mining Association, suggested several administrative changes regarding exemptions on small issues. Carl J. Trauerman criticized the unfair responsibility of the distributor or underwriter

of a new mining venture, suggesting modification whereby this would be corrected without opening the door to the unscrupulous dealer. He also pointed out objectionable and unfair features in the requirement that commissions be posted on the front page of the prospectus. Robert Palmer, secretary of the Colorado Chapter of the American Mining Congress, concurred in Mr. Fernald's views and made a plea for fewer "stop" orders and more "go" orders, for fewer and simpler forms, and for the elimination of the Commission's attempt to fix a valuation on undeveloped claims. Burt B. Brewster, editor and publisher of the *Mining and Contracting Review*, stated that legitimate mining was suffering from the sale of questionable securities intrastate which are exempted from the provisions of the act. He also protested against honest but incompetent representatives of the SEC within the states. J. J. Beeson pointed out the strenuous efforts made by the Commission to obtain advice and suggestions of interested parties in drafting the new form, and stated that the registration requirements do make it more difficult to sell mining stock issues.

Thursday Morning.—William B. Daly, manager of mines, Anaconda Copper Mining Company, presided over this session.

"SLUSHING VS. GRAVITY LOADING AT CLIMAX" was presented by W. E. Romig, general superintendent, Climax Molybdenum Company. Highlights were presented of the occurrence and mining methods in use at the world's largest molybdenum mine at Climax, and a detailed description was given of the difficulties of the old chute and grizzly system leading up to experimental slushing on the White Level, followed by successful application on the main Phillipson Tunnel Level. Total estimated savings of 5.1 cents per ton by using slushing rather than gravity loading have proved to be 7.09 cents per ton in actual practice, plus an additional safety factor.

Discussion of the paper was given by

Speakers



Harold L. Neff



Robt. S. Palmer



Ernest Gayford



W. L. Zeigler



W. E. Romig

Speakers



Edward L. Sweeney



D. Harrington



Whiting Williams

L. A. Walker, superintendent of the U. S. Smelting, Refining and Mining Company at Bingham, who reported that over a three-year period the cost of loading mechanically at the Bingham mine was about 20 percent below the hand loading cost.

W. L. Zeigler, mill superintendent, Hecla Mining Company, presented a paper on "ECONOMICS OF SMALL MILLING PLANTS," which comprised a detailed discussion of the general design, application and operating economics of numerous small milling plants. His complete paper is presented elsewhere in this issue.

Ernest Gayford, vice president of the General Engineering Company, discussed the paper by pointing out the vital necessity of thorough study, involving sampling, before actually testing the ores, and of including highly important indirect costs in such a study. He also offered cost figures for gold mines in the United States, Canada and South Africa, which indicated that little if any profit would be possible at the old \$20 per ounce price. Edward L. Sweeney, consulting metallurgical engineer of Denver, emphasized the importance of efficient operating personnel to the mill's success, once it is built.

The subject of "REDUCING COSTS OF WORKMEN'S COMPENSATION IN THE MINING INDUSTRY" was presented by Dan Harrington, chief, Health and Safety Branch, United States Bureau of Mines. He pointed out imperfections in the present compensation laws and the reason for dissatisfaction of parties concerned with them, indicating, however, that conditions in this respect are greatly improved over those in existence 30 years ago. The only way to reduce compensation costs is to reduce accidents, and records were cited of companies fostering safety programs. Present-day cost of accidents in a large group of mines studied is from 15 to 17 cents per ton. Safety Department activities cost on an average about 1 cent per ton. He ventured the opinion that 75 percent of mining accidents can be prevented, and

listed detailed recommendations of methods whereby accidents can be reduced.

Thursday Afternoon.—With A. E. Bendelari, Eagle-Picher Lead Company, presiding, this session was devoted to important labor relations problems.

"WHAT'S ON THE WORKER'S MIND TODAY" was presented by the well-known industrial relations consultant, Whiting Williams, who pleaded for closer attention of the employer to small personal complaints of the individual worker. He stated that many employers, like green salesmen, are paying too much attention to the labor leader and not enough to the customers they sell (their workers). The worker's major fear is of losing his job. He has great pride in it, and a better understanding of these facts by the em-

ployers would go a long way in avoiding labor disputes.

In discussing this address, Governor Hoffman, of New Jersey, expressed his sympathy for labor, but repeated that forcible seizure and holding of property was illegal and would not be tolerated in New Jersey. He pleaded for a better realization that the right of private property, furnishing the incentive to work, is as important to the worker himself as to anyone. W. H. N. Cranmer asked for more frank discussions of problems with the workers.

William W. Ray, attorney-at-law, Salt Lake City, then discussed "THE WAGNER ACT AND ITS AFFECT UPON THE MINING INDUSTRY." He reviewed the purposes and requirements of the act, and dis-



Happy over the success of the Convention. Left to right—John McCabe; Howard I. Young, President, American Mining Congress; A. E. Bendelari, Director, American Mining Congress.



W. W. Ray



W. Mont Ferry

Speakers



E. C. Alvord



Leo J. Hoban



Evan Just

cussed problems of state and Federal jurisdiction. Decisions concerning the act were analyzed, involving a new interpretation of interstate commerce. He ventured the opinion that large mining or smelting enterprises, doing interstate business, would come within the powers of the act, whereas mining enterprises operating and selling intrastate might properly be held to be so far removed from interstate commerce as to be free from the act's provisions.

Friday Morning.—With Donald A. Callahan, Wallace, Idaho, presiding, this session was devoted to the general subject of mine taxation.

Opening the discussion with a paper entitled "MINE TAXATION," W. Mont Ferry, vice president, Silver King Coalition Mines Company, pointed out the importance of mining as a basic industry, cited Bureau of Internal Revenue figures to show low average profits of mining companies, and listed 13 separate taxes paid by a typical mine. He criticized certain tax laws which do not recognize peculiar conditions surrounding mining, and attacked the undistributed profits tax and state taxes on gross income. His paper in full appears elsewhere in this issue.

"FEDERAL FINANCE AND TAXATION" was presented by Ellsworth C. Alvord, counsel, American Mining Congress, Washington, D. C. Speaking straight from the shoulder, Mr. Alvord presented a clear and concise picture of the national finance situation, emphasized growing deficits and their implications, and ended by a scholarly and forceful presentation of suggested amendments to the revenue laws, emphasizing in particular the many glaring defects of the undistributed profits tax which should be remedied at once.

The subject of "DEPLETION" was presented by two speakers. "THE FUNCTIONS AND HISTORY OF DEPLETION ALLOWANCES" was given by Evan Just, secretary, Tri-State Zinc and Lead Ore Producers Association, who outlined the fundamental peculiarities of the mineral industry which warrant the depletion allowance, and traced the history of depletion allowances, difficulties encountered, and the attempts at elimination of

these allowances. He issued a warning that the mining industry must be prepared to defend this firmly established and proved right in the next session of Congress.

Leo J. Hoban, secretary, Hecla Mining Company, spoke on the subject "WHY PERCENTAGE DEPLETION?" Figures presented by the Secretary of the Treasury in his letter to the President dated May 29, 1937, which indicated a certain loss of revenue to the Government by allowing depletion deductions, were challenged by Mr. Hoban. He then traced the development of the allowance, and quoted from decisions and expert studies to explain the ideas back of and reasons for percentage depletion. These were amplified by further explanations and examples, all indicating the desirability of retaining percentage depletion rather than the previous system in use for determining this deduction.

Discussion on this subject was given by Paul H. Hunt, mine manager, Park Utah Mining Company, who declared that the undistributed profits tax violates the fundamental American principle that the discoverer or inventor should be rewarded for his work. He showed conclusively how the law penalized particularly the small, independent miner developing a new property.

Friday Afternoon.—J. C. Kinnear, general manager, Nevada Consolidated Copper Corporation, presided at this, the closing session of the convention.

Edward H. Snyder, general manager, Combined Metals Reduction Company, presented a paper on "ANALYSIS OF PROPOSED WAGE AND HOUR LEGISLATION," which was a masterly description of the proposed law and of disastrous results its passage and enforcement would have on mining. Such results would compel the board, in an honest administration of the act, to issue no orders affecting wages and hours of the mining industry. He cited futile attempts in NRA days to regulate hours, and indicated the probability that a Labor Standards Board would make far more mistakes.

A declaration of Policy, comprising a concise statement of the views of the Western Division of the American Mining Congress on vitally important subjects of public policy, was then presented by Donald A. Callahan, chairman of the Resolutions Committee. This declaration, which was adopted unanimously, reads as follows:

A DECLARATION OF POLICY

• • •

THE WESTERN DIVISION OF THE AMERICAN MINING CONGRESS assembled in annual convention at Salt Lake City, Utah, September 10, 1937, herewith declares its views upon the following subjects of public policy:

TAXATION

The mining industry views with concern the continuation of excessive and unnecessary expenditures by the Federal Government. We again urge prompt reduction of Government expenditures and a balancing of the budget by this method. The burden of supporting our Government falls upon the people as a whole. That burden is already excessive.

The taxing power should be exercised only to raise revenues for the necessary expenses of the Government—not to redistribute wealth, nor to force social reforms, nor to bring about the control of industry by the Government.

We believe that many of the present rates of taxation are unduly high and beyond the point of maximum productivity. A reduction to reasonable levels will result in actual increases in revenue.

We recommend the re-establishment of the flat rate of corporation tax, the restoration of the right to make consolidated returns, the removal of the tax on dividends received by corporations, the carrying forward of business losses of one year to be deducted from future income, and the unlimited deduction of capital losses.

We condemn the principle of imposing a penalty upon corporations for failure to distribute earnings needed in the business. Experience under the Revenue Act of 1936 has established conclusively that it retards the development of worthwhile mining properties, imposes unfair and excessive burdens upon mining corporations which have incurred indebtedness for properties or improvements, prevents the proper expansion of facilities for treatment or utilization of the products of mines, penalizes the accumulation of proper reserves needed to maintain payrolls and carry on the necessary operation of mining properties during periods of low earnings over which the industry has no control, and discourages sound business programs which would create substantial opportunities for increased employment. It exacts an unreasonable penalty from corporations unable to avoid its application. In effect, it is not a tax upon income but a tax upon capital. It consumes capital that should properly and beneficially be expended for the legitimate purposes of the mining industry.

We deplore the ever-increasing efforts of administrative officials to attempt to impose maximum tax liabilities with little regard to the law or the merits of the case. There is no justification for administrative regulations and decisions contrary to the intent of Congress and the spirit of the statute, and in disregard of court decisions. The Govern-

ment should be as diligent in protecting the interests of its taxpayers as it is zealous in the collection of revenues.

We believe that the Board of Tax Appeals should be continued as an independent, impartial, nonpolitical agency for the judicial determination of disputes between taxpayers and the Government. Decisions of the Board of Tax Appeals, and of the courts, unless appealed from, should be accepted by the Government as established precedents and should control its future actions.

The Congress, the Treasury, and the mining industry, ever since the enactment of the first income tax law, have considered most carefully appropriate methods for the determination and computation of depletion allowances. From 1913 to 1936, the Congress has strived to select methods which would be subject to reasonable administration, involve only a minimum of expense, and avoid discrimination. The propriety of depletion allowances has always been recognized.

After years of consideration and study, after extensive investigations by committees of Congress, the staff of the Joint Committee on Internal Revenue, the Treasury Department, and the mining industry, the Congress, in the Revenue Act of 1932, extended to mines the system of percentage depletion. Although twice reconsidered, that method has remained applicable to the mining industry. The wisdom and soundness of the decision of Congress has been confirmed by the experience of several years. We are confident that further consideration of the subject upon its merits will establish convincingly the reasonableness and propriety of the present provisions of the law.

EXTENSION OF FEDERAL GOVERNMENT

We deplore the growing tendency to regulate business by the Federal Government.

We disapprove the policy of controlling state action through the medium of national legislation.

We oppose the growth of bureaucracy, and urge a return to government by law instead of by men through executive order or administrative decree.

RECIPROCAL TRADE AGREEMENTS

Changes in tariff rates through trade agreements with foreign countries should be proposed only after full public hearings called upon due notice and should become effective only after specific approval by the Congress.

GOVERNMENT IN BUSINESS AND PRODUCTION

We believe that business and production are not primary functions of Government.

We deplore the engagement of Government in business and production in competition with its citizens, and urge its retirement as rapidly as possible from all such enterprises in which it now is engaged.

We oppose all legislation designed to expand such activities of Government.

MONEY

We favor the return of the control of our monetary system to the Congress. We favor a currency with a metallic base as opposed to a so-called managed currency. We favor the use of both historic metals—gold and silver—in such monetary system, and we favor the continuation of purchases of newly mined domestic gold and silver as a means of providing and maintaining a metallic base for our currency.

LABOR

The essential interest of employee and employer is to obtain efficient production through the co-operative efforts of labor, management and capital. Government interference with such co-operation should be avoided.

Employers and organizations of employees should be subject alike to legal responsibility for their conduct and that of their agents. Employees should be free from coercion from all sources. The establishment of wage levels by legislation or fiat of governmental authority is contrary to sound economic principle. Wages ultimately are paid from income; income results only from production and is not created by law.

The mining industry as a whole recognizes its responsibility to its employees and to the communities where it operates, and met that responsibility by maintaining extensive employment throughout the depression. It has established its operations on the basis of fair and reasonable daily and weekly working hours, which compare most favorably with those in other industries, and which have permitted maximum efficiency, safety and satisfaction to all concerned.

We specifically oppose the attempted control of wages and working time by the Federal Government.

We believe in the best possible working conditions for the employees in the mining industry and approve all reasonable and proper measures for promoting their health and safety.

FEDERAL RESERVES FOR UNEMPLOYMENT AND OLD AGE

We view with concern the economic and social hazards involved in the ultimate accrual of a large reserve fund under existing provisions of the Social Security Act and we oppose the financing of the ordinary expenses of the government by the contributions from the paychecks of labor and from its employers under this Act.

We urge that Congress give immediate consideration to the amendment of this Act on a pay-as-you-go basis.

WATER POLLUTION

We believe in maintaining the purity of the waters of our country, and our industry is making every reasonable effort to that end.

We oppose legislation which would effect Federal regulations and control of the pollution of such waters. We believe that this is primarily a matter for state regulation, assisted where necessary by interstate compacts. We specifically oppose the regulatory provisions of the bill now pending in the Joint Conference Committee of the Senate and House of Representatives.

ROADS

We approve the construction of adequate public highways as a proper expenditure of public funds.

We urge that the benefits of public aid in the building of such highways be extended, where feasible, to the construction of roads of practical benefit to the mining industry.

PUBLIC DOMAIN

We endorse and approve the present system of locating mining claims and of granting patents. This system is well founded both in practice and in law, and for the future development of our country should be continued without change.

We deplore governmental prohibition of the development of valuable mineral areas in the National Game Preserves and needless restrictions to such development on other public lands. We disapprove the withdrawal of public lands from mineral entry.

SECURITIES AND EXCHANGE COMMISSION

The mining industry considers it of utmost importance to the public welfare that mineral explorations and new developments be encouraged rather than discouraged by the Government. Such enterprises are vital not only to the maintenance of this industry, which provides employment to many people and markets for many commodities, but also to the national defense.

In order to avoid almost prohibitive expense and unreasonable delays, which now stifle the development of many new or small mining enterprises and necessitate the surrender by their owners of disproportionate equities in order to procure funds to defray the costs of registration, we urge that the requirements for the registration of mining securities by the Securities and Exchange Commission be simplified and the procedure expedited to the utmost.

ECONOMIC STABILITY

Confidence is the foundation of economic recovery and stability. Essential to the restoration of confidence are balanced budgets, stable money, sound legislation confined to sound general principles, impartial administration of the law, and encouragement of private enterprise and initiative.

Session Chairmen



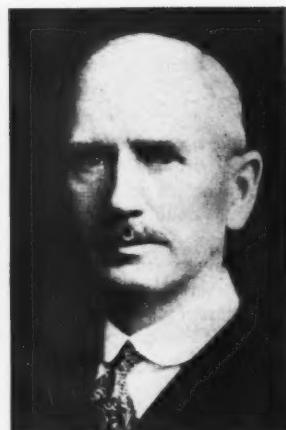
Robert Linton



David D. Moffat



P. G. Beckett



Jesse F. McDonald



Wm. B. Daly



Arthur E. Bendelari



Donald A. Callahan



J. C. Kinnear

The Exposition

Comprising one of the largest and most comprehensive exhibits of its kind ever held, 85 of the country's foremost manufacturers of mining equipment and supplies presented attractive displays of their products, which completely filled the arena and mezzanine floor of the Minerals Building. A visit to each of the booths together with close examination of the wares shown by the manufacturers comprised a highly educational and valuable experience; the exposition was a veritable parade of progress, exemplifying the modernization movement aimed at lowering the costs and increasing the efficiency of mining and concentrating operations. The delegates fully realized this fact, judging from the large crowds in constant attendance.

From both manufacturers and operators came enthusiastic comments concerning results of the exposition, many of them expressing unconcealed surprise at the splendid success achieved.

Without attempting to undertake a full description of these exhibits, suffice it to say that they included every phase of machinery and supplies used in mine operations both above and below the surface. Included were a great variety of actual equipment pieces, comprising such items as mine fans, heavy and light locomotives, Diesel engines, mine cars and wheels, concentrating equipment, pumps, safety equipment, storage batteries, mechanical loading equipment, conveyor



*Meeting old friends and inspecting some
of the exhibits.*

*Delegates being shown modern way to
cut metal.*

installations, rope and cable sections, drilling equipment, jacks, welding equipment, lubricating materials and electrical equipment. Other exhibitors presented attractive working models of mining and milling equipment, while one display featured a model of an entire steel plant together with its tributary mines. Still other manufacturers presented pictorial displays of their products, another called attention to its product by means of a clever puppet show, and another used moving pictures to emphasize important features of its equipment.

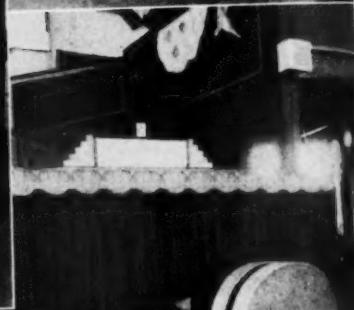
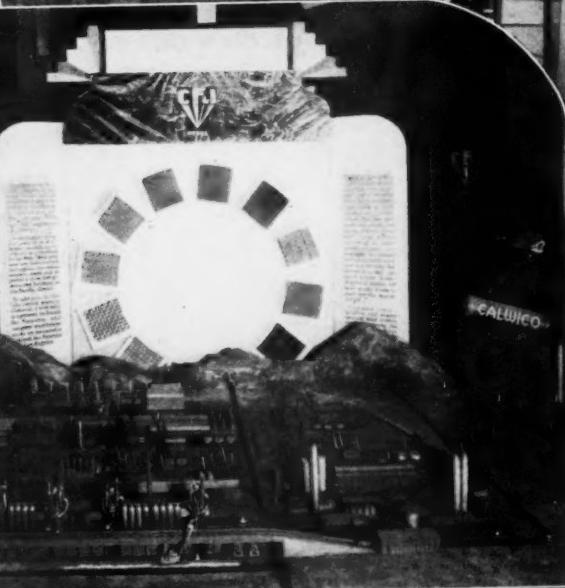
Visitors to the exposition found it an excellent opportunity to discuss perplexing problems involving equipment and supplies with the many expert representatives whom the manufacturers had placed in charge of the displays.

Several mineral producing states, together with the United States Bureau of Mines, cooperated in presenting mineral exhibits which attracted much favorable interest in the mining industry of these states.

The Minerals Building at the Utah State Fair Grounds, which served for both the exposition and the convention sessions, was efficiently prepared for the occasion under the expert direction of L. W. Shugg, serving as director of exhibits by courtesy of the General Electric Company. The building, used for horse shows at the state fair, was completely transformed and proved to be an ideal headquarters for a national industrial exposition, and the special convention hall erected on the mezzanine floor served admirably, although on certain occasions overflow space had to be provided. Mr. Shugg handled the many difficult problems which arose with his usual skill and tact, and contributed greatly to the success of the entire occasion.



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Opposite Page: Just a few of the 85 interest-compelling exhibits at the Exposition.



Above: General view of part of Exposition, showing ramp on left leading to meeting hall on mezzanine.



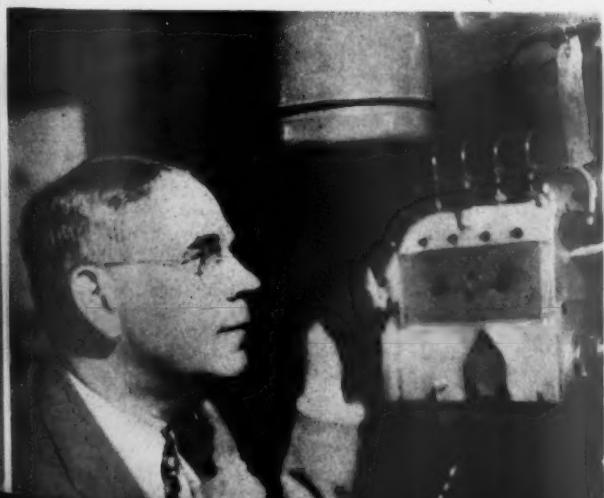
An "Old-timer" inspecting modern drilling equipment.



Left and Below: General views showing a variety of displays at the Exposition.



Below: L. W. Shugg looks over one of the exhibits.



Entertainment

So popular did the entertainment features prove to the hundreds of convention visitors, that considerable difficulty was encountered in accommodating the great numbers who made insistent requests for reservations upon relatively short notice. It is greatly to be regretted that facilities were not adequate to accommodate double the number who actually gained admittance to the many special attractions provided, but capacities in every case were stretched to the absolute limit.

A very pleasant pre-convention social event was the cocktail party given by Mr. and Mrs. Oscar N. Friendly at the Alta Club, Monday afternoon, September 6, for all committee members and various guests in attendance at the convention.

Welcoming Luncheon. — On Tuesday noon more than 400 delegates, including a goodly representation of the ladies, filled the main ballroom of the Hotel Newhouse to overflowing at the special Welcoming Luncheon. W. J. O'Connor, manager, American Smelting and Refining Company, presided at the luncheon, at which Governor Henry H. Blood, of Utah, and Mayor E. B. Erwin, of Salt Lake City, extended a warm welcome to all the delegates. Governor Blood gave a forceful account of the importance of the mining industry to the state, and praised the pioneering work of mining men in the state's development. He also outlined important historic happenings near Salt Lake City.

Mayor Erwin, after welcoming the delegates on behalf of the city, also indicated the importance of mining to the city itself, and the deep interest of its inhabitants in all matters affecting the industry.

Appropriate responses to these welcoming addresses were made by Howard I. Young, president of the American



Above: The Welcoming Luncheon.

Left: J. W. Wade, Chairman of the Hospitality Committee, to whom the highest credit is due for the spirit of good-fellowship which prevailed throughout the week.



J. W. Wade

Lower Left: Framing final plans for the Convention. Left to Right—Julian D. Conover, Secretary, American Mining Congress; Senator William H. King, of Utah; A. W. Dickinson, American Mining Congress; and A. G. Mackenzie, Secretary, Utah Chapter, American Mining Congress.

Mining Congress, and Guy N. Bjorge, national chairman of the Program Committee, on behalf of the mining representatives present, while William E. Goodman, chairman of the Manufacturers Division of the American Mining Congress, responded on behalf of the manufacturers. Musical entertainment was furnished by the White Chapel Male Quartet, whose selections proved very popular.

Mr. O'Connor introduced a considerable number of distinguished guests. The presence among these of Daniel C. Jackling, president of Utah Copper Company and Nevada Consolidated Copper Corporation, was especially gratifying to his many friends in the mining industry. Mr. Jackling was an interested and active participant in the events of the entire week; following the convention many of the delegates had occasion to visit the mammoth operations at Bingham, the scene of his pioneer work in bringing the famous "porphyry" coppers into useful and profitable production.

Country Club Party. — Early Tuesday evening some 500 convention visitors and their wives embarked in buses, taxis, and private automobiles for the dinner-dance at the Salt Lake Country Club, beautifully situated high on the foothills overlooking the city, near the mouth of





Left: James Ivers, Chairman of the Entertainment Committee, replenishes supplies at the Barbecue.



Below: Just a small part of the huge crowd who enjoyed the Barbecue in Big Cottonwood Canyon.

Parley's Canyon. Dancing was held inside the clubhouse and also on the lovely open-air terrace. Special entertainment was provided in the form of a floor show, featuring violin and accordian music, baritone solos, and a variety of talented dancers.

The Barbecue.—Immediately following the Wednesday afternoon session, hundreds of delegates and guests boarded special buses for a beautiful ride up Big Cottonwood Canyon to Maxfield Lodge for the mountain barbecue. The beauties of the ride up the canyon and of the situation of the barbecue site, nestled in a grove of cottonwoods hemmed in by the precipitous and lofty canyon walls, were particularly appealing. Following a delicious barbecue dinner, special singing and dancing entertainment was provided on an open-air stage.

Following this, buses took the crowd down to the Old Mill Club, a most attractive stone building rebuilt from the ruins of an old paper mill, where the entertainment was continued until the small hours with dancing and another floor show.

The Annual Banquet.—Climaxing the week's entertainment was the very colorful Annual Dinner held in the LaFayette Ballroom of the Hotel Utah, on Thursday evening, September 9. Well over 700 guests filled the banquet hall to overflowing, and tables had to be placed half way around the mezzanine floor to accommodate the crowd. Guest speaker at the banquet was the Hon. William H. King, U. S. Senator from Utah, who gave a striking account of the importance of the mining industry to the nation's welfare, and pointed out in what particulars he felt the Federal Government had not dealt fairly with it. He was introduced by W. Mont Ferry, vice president, Silver King Coalition Mines Company, who was toastmaster. Senator King's address was broadcast over a national hookup on the Columbia Broadcasting System, and will be presented in full in the October JOURNAL. Charles Igor Gorin, well-known Russian baritone, who has made a phenomenal rise since his recent arrival in the United States, thrilled the audience with several operatic and popular selections.

Guests at the speakers' table who were introduced to the audience by Mr. Ferry included, besides Senator King, the following: Governor Henry H. Blood, of Utah; Senator Key Pittman, of Nevada; former Senator Reed Smoot, of Utah; D. C. Jackling, president, Utah Copper Company; Howard I. Young, president, American Zinc, Lead and Smelting Company, and president, American Mining Congress; Dr. John W. Finch, director of the U. S. Bureau of Mines; Guy N. Bjorge, general manager, Homestake Mining Company and national chairman of the Program Committee; Jesse F. McDonald, governor, Colorado Chapter, American Mining Congress; D. D. Moffat, vice president and general manager, Utah Copper Company, and vice president, American Mining Congress; O. N. Friendly, vice president, Park Utah Consolidated Mines Company, and chairman of the board of governors, Western Division, American Mining Congress; E. A. Hamilton, general manager, U. S. Smelting, Refining and Mining Company; W. J. O'Connor, manager, American Smelting and Refining Company; J. F. Callbreath, secretary emeritus, American Mining Congress; A. E. Bendelari, Eagle-Picher Lead Company, and director, American Mining Congress; D. A. Callahan, attorney-at-law, Wallace, Idaho, and vice president, American Mining Congress; D. M. Kelly, vice president, Anaconda Copper Mining Company; Robert Linton, consulting engineer, Los Angeles; J. D. Collett, president, Mid-Continent Oil and Gas Association; L. P. Larsen, president, Pend Oreille Mines and Metals Company; W. E. Goodman, vice president, Goodman Manufacturing Company, and chairman, Manufacturers Division, American Mining Congress; J. D. Conover, secretary, American Mining Congress; Robert M. Sears, counsel, Newmont Mining Corporation; J. C. Kinnear, general manager, Nevada Consolidated Copper



Oscar N. Friendly
Chairman of the Board of Governors, Western Division, American Mining Congress



The Annual Banquet. Insert—Section of the speakers table showing, left to right: Senator Pittman, of Nevada; Senator King of Utah, Guest Speaker; W. Mont Ferry, Toastmaster; and Governor Blood, of Utah.

Corporation; P. G. Beckett, vice president, Phelps Dodge Corporation; Erskine Ramsay, chairman of the board, Alabama By-Products Corporation; James Ivers, general manager, Silver King Coalition Mines Company; Harry Sharp, manager, Associated Industries of Kansas; and E. O. Howard, president, Walker Bank and Trust Company.

Music during dinner was by William Hardiman and his concert orchestra, with Meriam Erickson, soprano soloist. Following the dinner program, a delightful evening of dancing was enjoyed by all.

Luncheon Meetings

Board of Governors.—On Wednesday noon a luncheon meeting of the Board of Governors of the Western Division of the American Mining Congress, presided over by Chairman Oscar N. Friendly, was held at the Hotel Utah. The following leaders of the mining industry were elected as members of the board for the year 1937-1938:

Alaska.—Roy Earling, Fairbanks Exploration Company, Fairbanks; P. R. Bradley, president, Alaska Juneau Mining Company, San Francisco, Calif.

Arizona.—P. G. Beckett, vice president, Phelps Dodge Corporation, Douglas; T. H. O'Brien, general manager, Inspiration Cons. Copper Co., Inspiration; ex officio, R. W. Thomas, governor, Arizona Chapter, American Mining Congress, Ray

California.—Thos. McCormack, president, Natomas Dredging Company, Sacramento; William Simkins, Newmont Mining Corporation, San Francisco; Harvey S. Mudd, Los Angeles.

Colorado.—Charles A. Chase, Shenandoah-Dives Mining Company, Silverton; George H. Rupp, manager, Mining Department, Colorado Fuel and Iron Corporation, Pueblo; ex officio, Robert S. Palmer, secretary, Colorado Chapter, American Mining Congress, Denver.

Idaho.—R. M. Hardy, president, Sunshine Mining Company, Kellogg; Lloyd C. White, manager, Yellow Pine Company, Stibnite; ex officio, J. W. Gwinn, secretary, Idaho Mining Association, Boise.

Montana.—W. B. Daly, manager, mines, Anaconda Copper Mining Company, Butte; J. D. Mackenzie, manager, East Helena plant, American Smelting and Refining Company, East Helena; ex officio Carl J. Trauerman, president, Montana Mining Association, Butte.

Nevada.—H. A. Johnson, general superintendent, Tonopah Mining Company, Tonopah; J. C. Kinnear, general manager, Nevada Cons. Copper Corporation, McGill; ex officio, Henry S. Rives, secretary, Nevada Mine Operators Association, Reno.

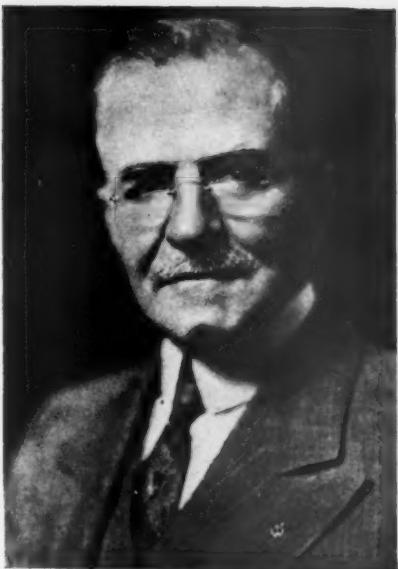
New Mexico.—R. B. Tempest, general manager, Nevada Cons. Copper Corporation, Hurley; Ira L. Wright, general manager, Black Hawk Cons. Mines Company, Silver City; ex officio, J. F. Woodbury, secretary, New Mexico Chapter, American Mining Congress, Silver City.

Oklahoma.—George W. Potter, vice president, Eagle-Picher Mining and Smelting Company, Picher; John A. Robinson, general manager, Commerce Mining and Royalty Company, Miami; ex officio, Evan Just, secretary, Tri-State Zinc and Lead Ore Producers Association, Miami.

South Dakota.—Guy N. Bjorge, general manager, Homestake Mining Company, Lead; C. E. Dawson, manager,



Charles Igor Gorin
Guest Artist



J. F. Callbreath

Secretary-Emeritus, American Mining Congress, whose presence at the Convention delighted his many friends.

Bald Mountain Mining Company, Trojan.

Texas.—Brent N. Rickard, manager, El Paso Smelting Works, American Smelting and Refining Company, El Paso; H. E. Treichler, general manager, Texas Gulf Sulphur Company, Newgulf.

Utah.—James Ivers, general manager, Silver King Coalition Mines Company, Salt Lake City; James W. Wade, vice president and general manager, Tintic Standard Mining Company, Salt Lake City; ex officio, A. G. Mackenzie, secretary, Utah Chapter, American Mining Congress, Salt Lake City.

Washington.—L. P. Larsen, president, Pend Oreille Mines and Metals Company, Spokane; Dean Milnor Roberts, professor, mining and metallurgy, University of Washington, Seattle; ex officio, Bliss Moore, president, Northwest Mining Association, Spokane.

Following a discussion of convention matters and expressions of appreciation to all those contributing to the success of the meeting, the question of a meeting place for 1938 was considered. Invitations from Los Angeles, San Francisco, Spokane, Joplin, Houston, New Orleans, Chicago, and Cleveland were submitted, and it was finally decided to leave the matter open for definite action at a later date. Considerable sentiment was also apparent favoring a return to Salt Lake City in view of its unusually advantageous location. Selection of a new chairman of the division was deferred pending final decision as to the 1938 meeting place.

Board of Directors.—On Thursday noon a meeting of the national Board of Directors of the American Mining Congress was held, at which Mr. Howard I. Young presided. Members and guests attending included:

P. G. Beckett, vice president, Phelps Dodge Corporation; Arthur E. Bendellari, Eagle-Picher Lead Company; Donald A. Callahan; J. G. Clark, manager, Gold, Silver & Tungsten, Inc.; H. B. Fernald, Loomis, Saffern & Fernald; W. Mont Ferry, vice president and managing director, Silver King Coalition Mines Company; Oscar N. Friendly, vice president and general manager, Park Utah Consolidated Mines; M. D. Harbaugh, vice president, Lake Superior Iron Ore Association; Howard R. Huston, assistant to president, American Cyanamid Company; James Ivers, treasurer, Silver King Coalition Mines Company; D. C. Jackling, president, Utah Copper Company and Nevada Consoli-

dated Copper Corporation; Frank L. Jones, second vice president, Colorado Mining Association; Evan Just, secretary, Tri-State Zinc and Lead Ore Producers Association; M. C. Lake, consulting geologist, M. A. Hanna Company; L. P. Larsen, president, Pend Oreille Mines and Metals Company; W. T. Lundy, vice president and general manager, Freeport Sulphur Company; A. G. Mackenzie, secretary, Utah Chapter, American Mining Congress; J. F. McCarthy, president, Hecla Mining Company; Jesse F. McDonald, governor, Colorado Chapter, American Mining Congress; D. D. Moffat, vice president and general manager, Utah Copper Company; Bliss Moore, president, Northwest



Luncheon Meeting of the Board of Governors, Western Division.



Luncheon Meeting of the Board of Directors, American Mining Congress, and guests.

Mining Association; W. J. O'Connor, manager, American Smelting & Refining Company; Judge James Owen, Denver, Colo.; Robert S. Palmer, secretary, Colorado Chapter, American Mining Congress; H. L. Pierce, secretary-treasurer, M. A. Hanna Company; Erskine Ramsey, chairman of board, Alabama By-Products Corporation; Henry M. Rives, secretary, Nevada Mine Operators Association; Robert Searls, counsel, Newmont Mining Corporation; Garnett J. Stolling, Island Creek Coal Company; James W. Wade, vice president and general manager, Tintic Standard Mining Company; Gloyd M. Wiles, general manager, Park City Cons. Mines Company; Julian D. Conover, secretary, J. F. Callbreath, secretary-emeritus, and A. W. Dickinson, American Mining Congress.

Recommendations of the Executive Tax Committee, which had held a number of meetings during the convention, were presented by its chairman, Mr. H. B.



Above: Mrs. W. Mont Ferry, right, General Chairman of Ladies' Entertainment, and Mrs. James W. Wade, Chairman of the Ladies' Annual Banquet Committee.



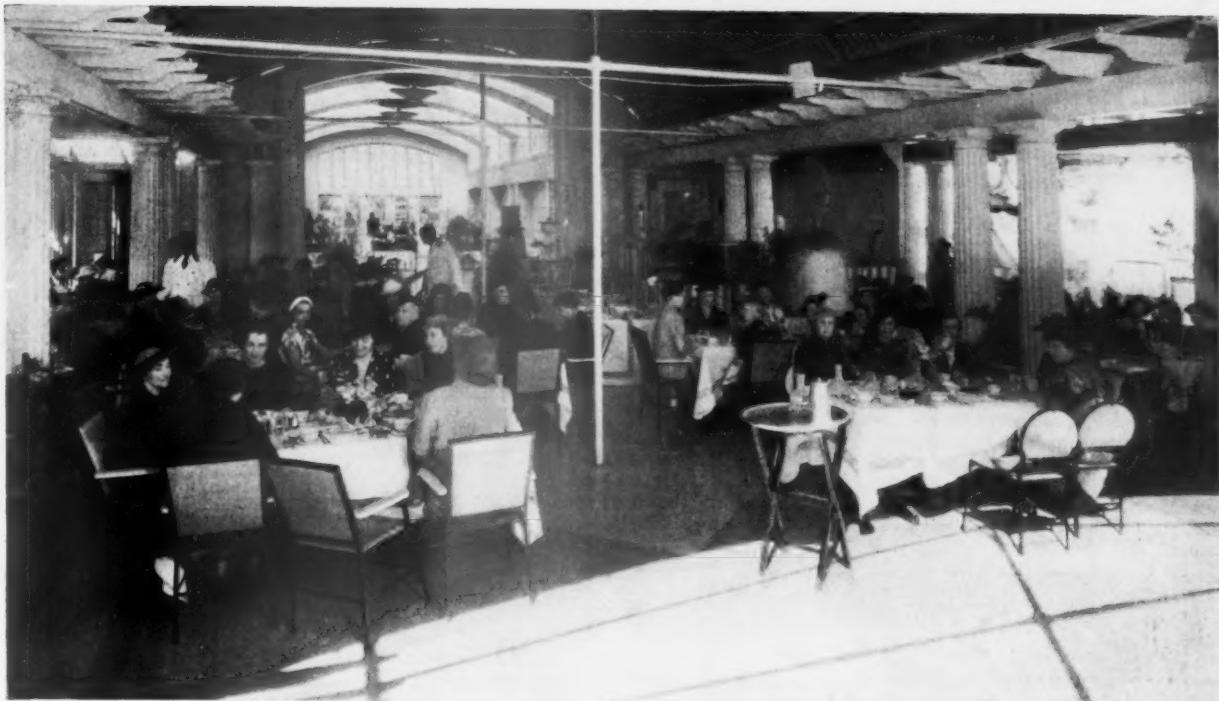
Left: Committee Chairmen. Left to right—Mesdames Burt. B. Brewster, W. R. Landwehr, James Ivers (standing), A. G. Mackenzie, E. A. Hamilton (standing), and R. A. Pallanch.

Fernald, and a spirited discussion ensued in which proposed revisions of the revenue laws, with special reference to the undistributed earnings tax and the depletion provisions, came in for searching analysis. Mr. Conover reported on the work of the Mining Congress as a whole and discussed legislation affecting mining which was enacted in the 75th Congress or pending at the close of the session. Reports were also presented by Mr. Herbert Wilson Smith, chairman of the Social Security Committee; Mr. Samuel H. Dolbear, chairman of the Committee for Cooperation with the Securities and Exchange Commission; and Mr. E. V. Daveler, chairman of the Finance and Budget Committee. A general discussion followed, in which gratification was expressed at the continued progress of the organization in serving the best interests of the entire mining industry throughout the country.

Special Ladies' Entertainment.—The ladies' entertainment, under the direction of Mrs. W. Mont Ferry, offered a great variety of very pleasing features to the record number in attendance. Almost twice as many ladies registered as ever before, and the warm hospitality



Mrs. J. D. Conover, left, and Mrs. Oscar N. Friendly, Chairman of the Reception Committee.



The Friday Luncheon of the ladies, on the roof of the Hotel Utah.

of the Salt Lake hostesses was felt at all times. Over 150 ladies attended the welcoming luncheon on Tuesday noon at the Hotel Newhouse, at which a special table was arranged for them. Mrs. E. B. Erwin, wife of the Mayor of Salt Lake City, was honor guest. Tuesday evening everyone enjoyed the dinner-dance and floor show at the beautiful country club.

Buses called for the ladies Wednesday morning to drive them around the city and up the foothills to the country club, where they were guests of the Salt Lake Women's Auxiliary of the A. I. M. E. at a delightful breakfast, at which Mrs. E. A. Hamilton, chairman of the Auxiliary, presided. The tables were beautifully decorated with Salt Lake's vivid flowers, and small hammered copper bookmarks held the place cards. Breakfast was followed by bridge and golf and another sight-seeing drive back to the hotel. The mountain barbecue Wednesday evening was attended by all.

On Thursday the opportunity was given to visit the exhibits at the Minerals Building and to explore some of the Salt Lake stores. All the ladies and their husbands were invited by Mr. and Mrs. D. D. Moffat to have cocktails in the afternoon at their beautiful home overlooking the city. This was followed by the banquet at the Hotel Utah.

Friday morning a special organ recital was given at the Latter Day Saints Tabernacle. Mr. Frank Asper, at the world-famous organ, played a number of old favorites, including Schubert's "Ave Maria," "Liebestraum," and "The Pilgrim's Chorus" from Tannhauser. This was followed by a beautiful buffet

luncheon on the roof of the Hotel Utah.

The Salt Lake City hostesses deserve much praise for their warm hospitality and thoughtfulness.

The Trips

Following the close of the convention proper, many delegates remained for the week-end to take advantage of the

splendid program of trips to nearby mining districts and metallurgical operations which were conducted on September 11 and 12. Goodly sized parties made inspection trips to the following operations on Saturday, September 11: (1) Murray and Midvale, visiting the lead smelter of the American Smelting and Refining Company, and the plant of the Utah Ore



Inspecting flotation operations at the plant of the United States Smelting, Refining and Mining Company, Midvale, Utah.

Sampling Company at Murray, and the concentrator and lead smelter of the U. S. Smelting, Refining and Mining Company at Midvale; (2) International (Tooele), visiting the concentrating and lead-copper smelting plants of International Smelting and Refining Company; (3) Ironton, visiting the plants of Columbia Steel Company and Pacific States Cast Iron Pipe Company; (4) Park City, visiting the mine and mill of Silver King Coalition Mines Company; (5) Park City, making a general geological surface tour of the district and visiting the Silver King Coalition Mines Company mill; and (6) Tintic, visiting the mine of Tintic Standard Mining Company.

On Sunday, September 12, all remaining delegates made up a large party going to the world famous open pit copper mine at Bingham, the precipitation plant, and the Magna mill of the Utah Copper Company, and the copper smelter of the American Smelting and Refining Company at Garfield.

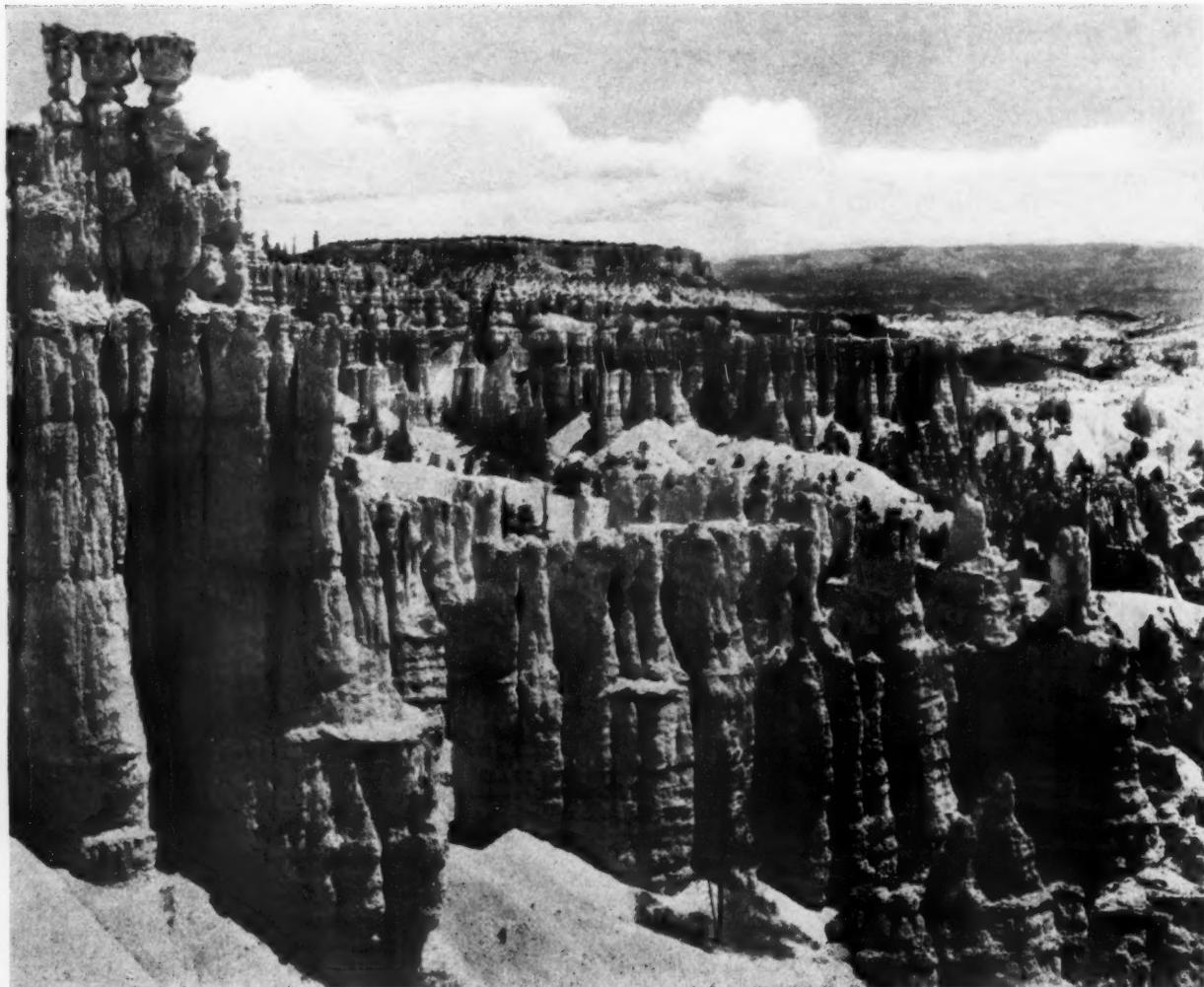
Landscape Arch—
Arches National
Monument,
Moab, Utah.



Luncheon was served en route on all trips by courtesy of the mines and plants visited. Delegates were more than pleased at the fine opportunities thus afforded to get intimate first-hand views of these famous operations.

Many convention visitors, either on

their way to or returning from Salt Lake City, took advantage of the fine opportunity to visit many of the beautiful national parks situated only a short distance away, and were amply repaid for additional time spent in this manner.



Bryce Canyon National Park, Utah.

Of All Things . . .

Well, things aren't so bad. . . . The third month of the fiscal year brought a marked reduction in the deficit. . . . Uncle Sam was only \$432,000,000 in the red with nine months yet to go. . . . At that, the figure is \$12,000,000 better than it was last year at the same time. . . .

The recent flurry, says former Associate Justice Willis Van Devanter in speaking of the Court tangle, will soon be forgotten. . . . Yes . . . just like everybody has forgotten about the Civil War. . . .

One sure thing, Senatorial "courtesy" is going to take an awful beating when the next nomination to the Supreme Court is proposed. . . .

You really can't blame the school children of today if they complain of the difficulties facing them. . . . Those of us who have put school days behind us didn't have to remember what TVA, SEC, NLRB, WPA and a score of other initials stood for when the current history teacher called on us to recite. . . .

Time was when being an ambassador was a nice job. . . . Nowadays he doesn't know at what minute he'll have to change from morning clothes to a bullet-proof vest. . . .

A girl who worked at a legislature session came to the opinion the legislators should wear knee pants and roll hoops. . . . She wasn't so far off. . . . They wear baggy pants and roll logs. . . .

We shouldn't gripe so much at this country. . . . When you stop to figure it out we haven't had a civil war for 73 years, an invasion for 123 years and up to now, we never had a purge. . . .

In September the Federal Communications Commission canceled, effective October 15, rates for telegraph messages from points in the United States to the airship Hindenburg. . . . Thus, five months after its destruction, the Government officially took notice that the airship was no longer able to receive messages. . . .

In Russia, if you haven't seen the party around for three days, he's probably dead. . . . Over here, he's probably in a hospital recovering from an automobile accident. . . .

It looks like Secretary Hull's road-to-peace plan has become pretty rocky. . . .

In these days of frugality in Government and demands for strict economy, the Congress cooperates by appropriating about a billion dollars more than it did the year before. . . .

In America you aren't born into the ruling class. . . . But once you pass a bar examination, you're not far away. . . .

"Roosevelt Plays Politics," says a headline. . . . it's getting so that you can't hide a thing these days. . . .

"Yes men in Congress, yes men on the bench, yes men in universities will not solve your problems," Senator Wheeler tells a college graduating class. . . . But, Senator, after all, we're living in a sort of Yes Man's Land. . . .

Freddie Bartholomew, drawing down \$1,850 a week, tells a court he can't make his budget stay in balance. . . . It looks like Freddie has missed his calling. . . . There's room for a chap like that in Washington. . . .

Somebody ought to tell Senator Ellender, of Louisiana, that if he really wants to be a help to President Roosevelt he ought to stop praising the President as a second Huey Long. . . .

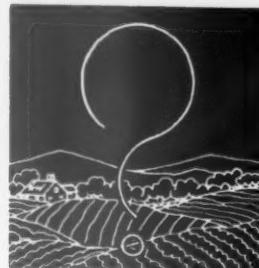
The session of Congress just ended cost the taxpayers about \$12,000,000. . . . That was only the actual running expense. . . . The Congress really spent just about one thousand times that much. . . .

A two-year-old child prodigy can name all the justices of the United States Supreme Court. . . . A certain President wishes he could do as well. . . .

The Federal Trade Commission has its troubles, too. . . . Besides the Congress wishing on it administration of conflicting price control measures, its latest headache comes from a case in which the widow of an owner of a business married the proprietor of a competing business. . . . The two businesses remain separate, but the Commission holds they are under unified control. . . . Looks like the Government will have to devise a consent decree covering the marital connection so far as it affects business. . . . Which goes to show how far the Government is really going these days. . . .

The political hatchet, said Mr. Farley, is buried. . . . Yeh, but somebody has a very accurate chart of the grave site. . . .

A veteran Missouri Congressman announced recently that he does not intend to run for reelection because he is tired of doing nothing. . . . Advertising like that is going to bring a flock of candidates for his job. . . .



Agricultural income is at the highest point in ten years, says a news dispatch. . . . If it keeps up the farmers will soon be prosperous enough to march on Washington and demand relief. . . .



Polaris Mill in the Silver Belt, near Wallace, Idaho.

Economics of Small Milling Plants[†]

By W. L. ZEIGLER *

THE place of small mills or ore-dressing plants was definitely established early in mining history. First, there was the beneficiation of gold-bearing gravels by screening, sizing, and washing. Later, metallic ores too low grade to be smelted were screened and washed in crude devices in order to make them profitable or even workable for metals. The whole process of milling has been a tedious evolution, from the small batches of ore handled by hand to the large mills of today, treating enormous tonnages, which require no actual human labor in their flow systems.

Milling plants located in many parts of the country vary widely in type suited to a very large variation in the types of ore which they are designed to treat. Of the simplest type, there is the jig mill, with perhaps a crusher and hand jig for concentrating heavy particles of minerals from a lighter gangue and also a small stamp mill containing a crusher, stamps, and amalgamation plate to recover precious metals. Both types have served the mining industry well. Later, with the discovery of hydrometallurgical processes for recovery of metals and the flotation process for concentration, a wide variety of milling plants has been developed which uses a combination of processes best adapted to treat the individual ore.

In this discussion, plants of any kind less than 250 tons capacity per 24-hour day will be considered small mills. Mills of this capacity are usually installed in the development stage of a mining property. They lead to larger, but perhaps not better, operations, or eventually fail on account of unfavorable development of the mine. In the Coeur d'Alene mining district, the mills of the large producers were preceded by small concentrators which were either expanded later as the mines were developed or were replaced by larger and improved plants. The same is more or less true for all mining districts with the exception of a few very large low-grade mines recently developed and placed in operation.

The installation of small mills is often justified by the fact that proceeds from ore extracted in development work in a property can often furnish sufficient revenue without the expenditure of additional capital. Also, they may determine and prove the process of milling best

[†] Presented to the Annual Metal Mining Convention, Western Division, American Mining Congress, Salt Lake City, Utah, September 9, 1937.

* Mill Superintendent, Hecla Mining Company.

adapted to the ore if it be complex in character.

If a mine has a definite reserve of commercial ore blocked out, without chance for additional tonnage, a small mill, with economical capacity for this particular instance, would be justified. In this case, the cost of the plant would be kept at a minimum and salvage value would be a consideration.

Custom Mills

In recent years, a number of large mills have been designed and equipped to treat custom ores in many districts. These mills have had a definite effect on the installation of small plants at mines which are moderate producers and are located within an economical transportation distance. There are many reasons in favor of a small producer shipping milling ore to a well-regulated custom mill. Some of these are, that the investment for a small plant is not required. Then, too, the larger mills have complete equipment and a well-trained staff. On the other hand, custom milling rates are usually high (\$2 to \$3 for selective flotation concentration), and together with transportation costs on large tonnages, the costs for low-grade ore are prohibitive. The extraction of metals by milling on small lots is usually determined by small batch flotation tests, and the custom mill is not going to take the worst of it on this score.

Large central or custom mills, however, have proven to be successful as evidenced by the Bird Dog and Central mills in the Tri-State District; the International mill, at Tooele, Utah; the U. S. Smelting Company mill at Murray; the Timber Butte mill at Butte, Mont.; the Hercules mill, in the Coeur d'Alene District; and the Golden Cycle mill at Colorado Springs.

Costs of Small Mills

The cost of small mills varies greatly with the type, location with reference to transportation, climatic conditions, and a large number of other factors too numerous to mention. Each mill is more or less of an individual problem, since ore from different mines seldom has similar characteristics or conditions, even in the same district. The development of the flotation process has done much to standardize concentration mills, but has not by any means made a single type universal. Recently, some manufacturers have designed and made small mills complete with steel framework cut and ready to assemble. The flow sheet of these is made flexible enough so that a variety of ores may be concentrated without altering the assembly to a large extent.

Single product flotation concentrators up to 200 tons daily capacity (24 hours) cost from \$300 to \$600 per ton of rating, exclusive of power or any extensive cost of water-supply development. Smaller units naturally cost more in proportion than those of larger capacity. Mills designed to produce two concentrate products cost about 30 percent more than those producing one concentrate.

Small cyanide plants are very inex-

pensive when coarse crushing and leaching is sufficient, but the cost may rise to well over \$1,000 per ton of rating if all slimes, leaching with vacuum process zinc dust precipitation is used.

Another type of small, low-cost mill, used where free gold is present in the ore, is a simple flotation type using ball mills for grinding, with a pulsating jig between the ball mill discharge and the classifier. Recent developments in this type of jig have made it a very efficient concentration machine which will, in most cases, recover more free gold in a high-grade concentrate than is possible to amalgamate. The resulting high-grade jig concentrate can then be amalgamated in a barrel with the danger of amalgam theft practically eliminated. The jig in this position will catch free gold as it is liberated by grinding, and prevent the circuit from becoming enriched with coarse gold particles.

Milling Costs

It is very difficult to make a comparison of milling costs in small mills situated in different parts of the country. The tabulation on page 40 compiled from recent information circulars published by the U. S. Bureau of Mines shows milling costs of a variety of small mills with a great variation in milling costs.

Information relative to costs in small mills is rather meager as most operations of this size do not keep detailed costs as in larger plants. It is possible, however, with a well-designed mill of small capacity, to obtain operating costs that are comparable with large operations—overhead costs spread over a small tonnage are necessarily higher.

Standard Silver Lead Company Mill

A few mining operations, demonstrating the practicability of small mills, will be described briefly. Notably successful among these is the mill of the Standard Silver Lead Company, at the Gould mine near Marysville, Mont. Early in 1930 a development program was started, and enough ore discovered in the mine to justify a small development mill. The ore consists of quartz containing very

fine free gold, with a small quantity of argentiferous pyrite. While some machinery was on the ground, a small flotation mill of 35-40 tons capacity per 24-hour day was constructed at a cost of about \$12,000. Electric power was already available at the site. The mill was operated mostly on development ore until early in 1935, at which time sufficient ore was blocked out to justify a larger and more efficient plant. During this period, the production from the small mill not only carried the expense of development, and paid in royalties a good proportion of the purchase price of the mine, but also put enough money in the treasury to construct the larger mill. The price of gold was raised during this operation, and while the extraction by the flotation process was economical at the old price, it was decided to use the cyanide process for increased efficiency of the larger mill. During the summer of 1935, a cyanide plant of about 100 tons capacity was added at a cost of \$35,000, and the extraction of gold was raised from about 90 to over 97 percent. The flow sheet of the cyanide plant does not vary much from ordinary practice. The ore is crushed in two stages by jaw and gyratory crushers. Fine-grinding equipment consists of a 7' x 36" Hardinge ball mill in closed circuit with a 6' x 20' Rake-type classifier, cyanide solution being added to the circuit. The classifier overflow flows to two 30-ft. thickeners, the overflow solution going through clarification boxes to zinc-dust precipitation unit. The underflow of thickeners passes through four 12' x 10' Devereaux-type agitators to a 30-in. thickener, at which point barren solution is added. The underflow solids are filtered by a 14" x 10' drum-type filter, the filtered cake is repulped and treated by flotation for silver minerals not dissolved. This concentrate is then sent to the grinding circuit and passes through the cyanide system for extra time of contact. No building up of this material in the circuit is apparent.

This operation is running steadily and paying regular dividends to stockholders at the present time.



Gnome Cyanide Mill, Near Orogrande, Idaho.

Milling Costs in Dollars Per Ton								Notes		
Name and Location of Mill	Capacity —Tons Per 24 Hours	Process	Mill Feed	Date of Report	Crushing and Grinding	Concentr. and Dewater- ing	Disposal of Tailings	Assaying and Misella- neous	Total	
Molybdenum Corp. of America, Questa, N. Mex.	40	Flot	5% MoS ₃	1932	\$0.21	\$2.03	—	\$0.46	\$2.69	Owens Power Plant Labor approximately \$5.00 per shift
Harmony Mines, Baker, Idaho	200	Flot	3.84% Cu.	1930	.36	.142	\$0.010	.09	.651	Power \$.014 per K.W. hr. Labor approximately \$6.00
Spring Hill Conctr., Helena, Mont.	160	Flot	\$6.46 Au.	1931	.452	.258	.052	.245	1.007	Power \$.008 per K.W. hr.
Hog Mountain Gold M. & M., Alexander City, Ala.	75	Flot	.220 oz. Au.	1936	1.011	.262	.001	.209	1.483	Labor \$1.00 to \$2.75 per shift
Kirkland Lake Gold Mines, Kirkland Lake, Ont.	160	Cyanide	\$11.38 Au.	1931	.7867	.6858	—	.0165	1.389	Labor \$4.00 to \$5.00 per shift
Golden Messenger Mine, York, Mont.	125	Cyanide	.20 oz. Au.	1937	—	—	—	—	—	Power \$.0061 per K.W. hr. + \$1.00 per mo. per H.P. Labor \$4.25 to \$4.75
Silver Dike Mill, Mineral County, Nev.	25	Gravity	8% WO ₃	1932	2.651	.854	—	.144	2.649	Power \$.03 per K.W. hr. Labor \$5.00
Big Jim Mine, Oatman, Ariz.	50	Cyanide	Au. Ag.	1935	.790	.838	—	.809	2.437	Power \$.026 per K.W. hr. Labor \$4.00 to \$6.00
Doyle Mine, Shullsburg, Wis.	80	Gravity	Zn. Pb.	1936	—	.2438	—	.1478	.4916	Underground Mill Labor \$2.50 to \$5.00
Pilgrim Mine, Chloride, Ariz.	100	Flot	Au. Ag. 136 oz.	1937	—	—	—	—	—	1.049
Davis-Dunkirk Conctr., Prescott, Ariz.	75	Flot	Au. Cu. Ag.	1933	—	—	.12	.1.11	1.23	Labor \$5.00
St. Joseph Lead Co., Atlanta, Idaho	220	Flot	Au. Ag. 1.541 oz.	1935	.674	.331	.057	.10	1.162	Owens Power Plant Labor \$4.50 to \$5.50
Chief Cons. Mining Co., Eureka, Utah	300	Flot	Pb. 11.36% Ag. 18 oz. Au. .0987 oz.	1930	.5853	1.8254	.0621	.7441	3.2169	Power \$.01 per K.W. hr.
St. Joseph Lead Co., Hughesville, Mont.	400	Flot	Pb. 6.21% Zn. 5.01% Ag. 9.09 oz.	1931	.2219	Note .2630	.0320	.4597	.9666	Note: Cost of reagents not included Labor \$4.50 to \$6.50
Black Hawk Conctr., Hanover, N. Mex.	180	Flot	Ag. 2 oz. Pb. 2.5% Zn. 12.4% Cu. 1/2%	1930	.5135	.6079	—	.4292	1.5506	
Montana Mine Conctr., Ruby, Ariz.	250	Flot	Au. .971 oz. Ag. 8.17 oz. Pb. 5.13% Zn. 5.98% Cu. .39%	1931	.5732	.6484	.0623	.9181	2.2020	Owens Power Plant

Mill at Mammoth Mine

In the latter part of 1929, a concentrator of 150 tons per day capacity was erected on the shore of Slocan Lake, in British Columbia, to treat the ores of the Mammoth mine, which is located about $2\frac{1}{2}$ miles in distance and 3,000 ft. in elevation above the mill site. It was necessary in the construction program to install an aerial tramway over a very precipitous profile, as well as a hydro-electric plant to furnish power for the operation.

The proven ore in the mine assayed about 18 oz. silver per ton, 4.5 percent lead, and 6.0 percent zinc. The crushing end of the mill consists of a jaw crusher, screens, and two sets of rolls for secondary crushing, as the ore is wet and sticky. The grinding end has a 6' x 4' conical type ball mill in closed circuit with a 6' x 20' rake-type classifier. The overflow of the classifier flows to a 10-cell line of 18-in. M. S. Sub A cells, where a lead concentrate is produced. The tailings from the lead end flow to a similar line of flotation cells which produce zinc concentrate. Both concentrates are thickened and filtered by a leaf-type filter and are stored in large bins, as barge service on the lake is irregular. The principal problem in the concentration of this ore was to get as much silver into the lead concentrate as possible, because of more favorable smelter settlements. A system of flotation reagents was worked out, which, in actual practice, gave much better results than laboratory tests had shown. During the depression the plant was closed, but started operation in 1936 and is giving a good account of itself.

While isolated from the mine, the power plant and mill are close together. Two men operate the plants on night shifts without difficulty. The tramway completed, cost about \$100,000; the mill, \$75,000; and the hydro-electric plant of 350 hp., about \$75,000. Milling costs for this selective separation are about \$1 per ton.

Gnome Mill

An example of a small cyanide plant is well illustrated by the Gnome mill, located on the South Fork of the Clearwater River in central Idaho. Development work in the mine previous to the installation of the mill had shown a fair-sized ore body assaying about 1.5 oz. of gold per ton. The mine is located about 65 miles from a branch line railroad and the road through the canyon was not passable for heavy loads.

A cyanide plant of 25 tons per day capacity was constructed in 1932 to treat the high-grade gold ore. The crushing and grinding end of the mill consists of a fine jaw crusher, a 4' x 5' ball mill in closed circuit with a 2' 6" x 15' rake-type classifier. Grinding is done in cyanide solution and the overflow of the classifier is pumped to a 20' x 8' thickener; overflow solution from which is clarified in wood excelsior beds and flows through zinc shaving precipitation boxes. The thickened pulp is pumped by diaphragm pump to three Devereaux agitators in series, and is then pumped with barren

solution dilution to another 20' x 8' thickener. The overflow solution from this tank is pumped to the grinding circuit or to the clarifier as the value warrants. The pulp from the thickener is pumped to a 6' x 6' Oliver filter, the tailing cake from which is repulped and washed to tailing impounds.

The power for the plant is furnished by two 50-hp. medium-speed Diesel engines belted to line shafts—one engine drives the crushing and grinding end, and the other the cyanide treatment installation. A small electric generator furnishes lights and power for several small motors. The cyanide plant installation cost about \$23,000, including the Diesel engines. Operating costs average \$2.50 per ton.

Unfortunately, the high-grade ore was milled while the price of gold was \$20.67 per ounce. Deeper development in the mine did not show any appreciable tonnage of high-grade ore, so the operation of this small-capacity mill is barely profitable.

Polaris Mill

The new Polaris mill, in the Coeur d'Alene District, is an example of a small initial mill designed so that the capacity may be doubled or tripled with low cost if future development of the mine warrants the expansion. In this plant, construction and equipment are of the best type suited to the location.

Ore is transported by 1½-ton ore cars drawn by a trolley locomotive through the tunnel 12,000 ft. in length to the ore bin at the top of the mill. This bin is of reinforced concrete construction, circular in form, and has a capacity of about 700 tons of mine-run ore.

The crushing plant and mill are of the steep, hillside type, progressing from the track at tunnel level straight down the hill to the flat below, a slope distance of about 300 ft. A railroad spur serves the plant from the main line of the Union Pacific Railroad to the bottom of the mill for the purpose of delivering timbers and mine supplies to the storage yard on the flat, as well as receiving concentrates from the storage bin at the bottom of the mill.

Ore drawn from the air-operated gate in the mine-run ore storage bin passes over a grizzly with 2-in. openings before falling into a 18" x 30" Traylor jaw-type crusher set at 3-in. spacing. The crushed ore falls to a 24-in. belt conveyor below, where it joins the undersize ore from the grizzly already on the belt. The conveyor delivers the coarsely crushed ore to an Allis-Chalmers vibrating screen with 1-in. square mesh. Oversize ore from the screen falls directly into a 3-ft. Traylor reduction crusher set at ½-in. opening. The crushed ore joins the undersize from the screen on a 20-in. belt conveyor and is delivered to a point above the crushed ore bin of 400 tons capacity. At this location there will be installed later a 48" x 72" vibrating screen with ½-in. mesh. The undersize will fall directly into the bin and the oversize will be conveyed to a 16" x 48" set of crushing rolls operating in closed circuit with the screen.

The crushing plant when completed will have a capacity of 80 tons of ore per hour, and will crush sufficient ore on one shift to supply the contemplated enlarged mill for 24 hours per day operation.

Grinding, concentration, and filtering equipment is contained in the lower or main part of the building. Under the crushed ore bin are located two sliding pan ore feeders, which regulate the flow of 200 tons of ore per day to one 8' x 22" conical type ball mill in closed circuit with a 4' x 21' Dorr-type "F" classifier. The overflow from this classifier is regulated so that a relatively coarse grind is obtained and flows directly to a 4-ft. rotor-type flotation cell, from which a high-grade silver concentrate is produced. Tailings from this cell are pumped to a regrinding unit consisting of an 8' x 22" conical type ball mill in closed circuit with a 6' x 21' Dorr-type "F" classifier. The overflow from the classifier, regulated so that a fine grind is obtained, flows to a line of five flotation cells operated as roughers. Froth from these cells is pumped to one cleaner cell producing finished concentrates which flow together with concentrates from the coarse flotation cell to a 20' x 10' thickener tank. Thickened concentrates are filtered by a 4' x 4' drum-type filter and drop into a 100-ton concentrate storage bin.

Water for the plant is obtained from Rosebud Gulch and from a drilled well located on the flat near the main line of the railroad. Electric power is furnished from the lines of the Washington Water Power Company, which serve the district.

In the operation of the mill at present capacity, a crusherman and helper crush the ore for the day in about three hours and are used for other general work the remainder of the shift. The concentrator end is operated by a head flotation man and helper on each shift. As there is little attention required in the mill, the helper takes care of the heating plant and miners' dry room, located in a building near by.

The mill installation cost about \$100,000, and surface plant buildings, roads, pipe lines, an additional \$42,000. Mill operating costs are 72 cents per ton with the present high labor wage scale.

All the mills that have been briefly described are well designed and constructed plants. While they do not represent a complete cross-section of all the various types of small mills, it is hoped that at least some idea may be gained of the problems involved in installing small, economical plants.

Detailed Considerations Important

Many things must be taken into consideration in designing small mills, and all are equally important as they are in large plants. The economic metallurgical process to be used should be determined thoroughly by testing average milling ore. Location with reference to ore sources for economical transportation, water and power supply, tailings disposal, and minimum requirements for labor are important.

Most small mills use single-stage crushing in order to avoid the cost of secondary crushers along with the necessary conveyors or elevator and bins. When the ore to be treated is soft, this is feasible, but it must be taken into consideration that small diameter ball mills are very poor and inefficient crushing machines. Some new designs of jaw crushers have lately appeared on the market which will make a large reduction in crushing in one stage and will deliver a product as small as $\frac{1}{2}$ in. where the ore is dry. The capacity of this type decreases very rapidly where the ore is wet or gummy.

Coarsely crushed ore, when stored in bins ahead of the ball-mill grinding unit, will invariably feed out of the bin either mostly fine or entirely coarse. There is nothing which will upset the grinding circuit as much as this condition, because of variation in capacity of the ball mill on fine or coarse ore particles. The finer that ore is crushed before grinding, the less liable this condition is apt to happen. Ore feeders which regulate the flow of ore to a grinding circuit are very important, and the best equipment for this purpose is a necessity. There are a number of successful machines which will do the work properly, but some are better than others operating under different conditions.

For grinding in small plants, ball mills are used universally. Gravity stamps are still used in some plants where free gold is present in the ore, and they are probably the best amalgamating machine in use. It is very important to have proper classification in connection with the ball mills to procure efficient grinding. If possible, the classifier should be placed in relation to the ball mill so that gravity flow into and out of it can be obtained.

Whether or not flotation, cyanidation, or other processes be used in treatment of the ore, much care in design should

be taken so that a minimum of labor in operation will be required. One operator, at least, in the plant is necessary, as the fully automatic mill has not yet been designed. Whether the mill is 15 or 200 tons capacity per day, at least one attendant must be present. If the plant is isolated, some states have laws that two men must be on the job. It is true, however, that the men can do other work and attend the mine air compressor, power plant, or various other jobs if the location is suitable.

Power Installations

Many years ago, small isolated mills used either steam or water, if available, to generate power. On account of high labor costs, steam power has almost entirely disappeared. If a sufficient volume of water, having fall enough to generate power, is available within close distance of the mill, it will be economical to invest at least \$150 per horsepower to install it. Small waterpower plants usually are susceptible to very low periods of flow at seasons and also freezing if in a cold country. Invariably, they have to be supplemented with other sources of power during the low-water periods.

The use of Diesel engines for power sources has developed very rapidly and filled a very important place in power generation at isolated locations. There is now available in almost every section of the country a supply of standardized Diesel fuel oil at reasonable cost. Twenty-five years ago, engines of this type were bulky, expensive, and troublesome machines. During the last five years, a number of very dependable, light, medium-speed Diesels have been developed which are ideal power units for small mining operations. These engines are made into complete power units, ready to belt or attach to generators, and the installation cost is very low. In addition, some manufacturers have a very complete service for the engines,

and experienced Diesel service men may be obtained on short notice in case of engine trouble.

Whether or not Diesel engines or water wheels should be belted to the various machines instead of generating electric current for power is an economic matter, as well as a practical one. Well-designed transmission will be more economical in cost and operation and should be considered where oil prices are high. This system is, however, inflexible and is very seldom adaptable to expansion. In some mills, the heavy loads could be belted from the engine and a small electric generator be used to furnish power for necessary lights and small motors around the plant, thus saving in both installation cost and losses due to generation and transmission of electric current.

Small Mills Average About \$0.75 Per Ton

As already stated, it is difficult to obtain records of costs on small milling operations as few detailed reports are made or recorded. Costs in mills using the simplest metallurgical processes will be at least \$0.50 per ton, and when conditions are extremely complicated will be as high as \$3 per ton. At the present time it is safe to estimate simple flotation concentration, under average conditions at 100 to 200 tons daily capacity, will cost about \$0.75 per ton.

Mining districts are dotted with properties which failed and were equipped with small milling plants. This is due to a greater extent in overestimated or failure of ore bodies rather than metallurgical or economic failure of the operation of the mills. In such cases, the machinery from the mills is usually taken to other mines or sold to used-machinery dealers furnishing an abundant supply of used equipment which is available for other similar installations.



Mammoth Mill, Silverton, British Columbia.

Air Conditioning for the Ventilation of the Butte Mines[†]

AIR CONDITIONING, or air cooling, for the ventilation of the Butte mines is distinguished from most air-cooling methods mainly by the fact that the cooling effect is derived directly from the surface atmosphere without the use of a compressor or other artificial refrigeration machinery. The average annual temperature in the district is approximately 40° F., with exceptionally low relative humidity during the summer months, so that unlimited natural cooling power is available at a usable temperature range. A satisfactory solution of the ventilation problem required only a means of making this natural cooling power of the surface atmosphere effective in the working zones of the mines, and it is the purpose of this paper to describe the method that has been developed.

Ordinary methods of mine ventilation are subject to somewhat unusual limitations in this district. Because of heavy, shifting ground, the mine shafts are of small size, and the timbering offers great resistance to the flow of air. To reduce this resistance so far as possible, the shaft compartments in the air shafts have been smooth-surfaced to form separate, smooth-surfaced, rectangular ducts, and extensions of these shafts to greater depth have been made with octagonal shafts supported by skin-to-skin timbering.

At many of the important copper-producing properties the operating zone is now at a depth approximately 3,500 ft. below the collar of the shafts. In traversing these deep shafts, the temperature of the air entering the mines is raised by heat imparted to it by the rock, and also by compression due to the increase in atmospheric pressure. Near the collar of the inlet shafts the temperature of the air closely follows that of the surface atmosphere, and in winter it is often below zero degrees Fahrenheit. At shaft stations below the 3,500 level this air is seldom at a temperature of less than 65° F. even when temperature at the surface is below zero, and the seasonal variations at these levels usually do not run more than 5° to 10° F.

[†] Presented to the Annual Metal Mining Convention, Western Division, American Mining Congress, Salt Lake City, Utah, September 8, 1937.

[‡] Ventilation Engineer, Anaconda Copper Mining Company, Butte, Mont.

By A. S. RICHARDSON *

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EDITOR'S NOTE: *The fine discussions of Mr. Richardson's paper by Messrs. Wm. Koerner and C. B. Foraker, of the Magma Copper Company, and by J. F. Kooistra, representative of the Carrier Corporation, will appear in the November Journal.*

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In passing from the inlet shafts to the working zone a further increase in air temperature occurs due to heat absorbed from the rock in the connecting cross-cuts. The amount of this temperature increase is highly variable due to differences in the length of these main air courses, but not infrequently the temperature of the air reaches 75° F., or more, with relative humidity of 70 percent before it reaches the stopes.

In summarizing these results it may be said that air which leaves the surface at an average annual temperature of 40° F., and with a water-vapor content of about 1.8 grains of water per cubic foot, is so heated and humidified as reaching the working zone that its temperature is raised to about 75° F., and the water-vapor content increased to about 6 grains per cubic foot. Appreciable variations from these conditions occur at all mines, and the figures are given only to show that the capacity of the air to cool and improve working conditions is much reduced before it reaches the working places.

A consideration of these facts indicates that maximum efficiency for any cooling process can be realized only when the cooling effect is brought as closely as possible to the working zone.

Circulating Water or Brine the Transfer Agent

The method that has been worked out for making the cooling power of the surface atmosphere effective at the working zone is illustrated by the diagram Figure 1. Referring to this diagram it may be seen that water, or brine, is cooled at a surface cooling tower from

which it flows through a pipe line in closed circuit to an underground air-conditioning plant located close to the working zone, and then returns through another pipe line back to the surface cooling tower. Thus, heat which is absorbed from the mine air at the underground air-conditioning plant, is transferred to the water, or brine, circulating through the pipe system, and dissipated in the surface atmosphere when the water is again cooled at the cooling tower. Since the pipe lines and underground air-conditioning plant form a closed-circuit pipe system for the circulation of the water the hydrostatic head is balanced, and power is required only to overcome frictional resistance to flow.

Successful operation of this plan depends upon the fact that for each degree of increase in temperature a cubic foot of water will absorb about 4,000 times as much heat as will be absorbed by a cubic foot of dry air under conditions existing at the surface in the Butte district. Absorption of water vapor by air in its passage through the mine increases its capacity to remove heat from the workings so that the figure given is not an exact measure of the relative heat capacity of water and air, but it does afford some basis for comparison. From this it follows that a relatively small pipe will carry a quantity of water that will suffice to remove from a mine more heat than would be removed by the circulation of a volume of air for which a large-sized shaft would be required. Further than this, no temperature increase due to compression occurs in the water, and since the pipe lines may be readily insulated it may be delivered to the underground air-conditioning plant at a temperature only a few degrees above that at which it left the surface.

Details of Underground Plant

The present underground plant is composed of four groups of parallel flow pipe coils which are connected in series and through which the cold water is circulated in a direction counter-current to that of the air. In connection with each of the four groups of pipe coils, a sepa-

rate system of water sprays is used for which the water is circulated by a pump in closed circuit. The action of these sprays is to wash the air, and transfer heat from it to the water inside the pipe coils. After having been sprayed into the air and in contact with the pipe coils, the spray water falls into a sump, from which it is drawn by a pump and again forced through the sprays. Between each of the four groups of pipe coils there are eliminators, or baffle plates, to prevent the spray water from being blown down stream. Copper is used for all pipe coils, and will be used in all future eliminators in order to avoid trouble due to corrosion.

Special Method for Summer Months

During the greater part of the year temperatures at the surface are low enough so that little difficulty is found in cooling the water as low as is necessary for this service. During the summer months it is more difficult and a special method has been worked out in which the very low humidity of the air is utilized to cool the water below customary limits. Before describing this process it is necessary to recall that in any unsaturated mixture of air and water vapor such as we have in the surface atmosphere there are three temperatures that are indicative of the condition of the atmosphere as to heat and humidity. Highest of these is the sensible temperature, as recorded by the ordinary thermometer. Below this occurs the wet-bulb temperature, recorded by the wet-bulb thermometer, or the ordinary thermometer having the mercury bulb enclosed in a thin moistened cloth and placed in a moving current of air so that the water in the cloth is subject to evaporation. The wet-bulb temperature is the temperature of evaporation, or the temperature to which water may be cooled by air as illustrated by the cooling of water in a water bag. Below the wet-bulb temperature is the dew-point temperature which, as is implied by the name, is the temperature at which if the air be cooled with a lowering of the sensible temperature, the water vapor in the air will commence to condense to liquid form and be precipitated as dew. In the Butte district, during the summer months, the sensible temperature seldom exceeds for any length of time 90° F., wet-bulb temperature 60° F., and dew point 39° F. Even during the warmest month, July, the dew point often passes below the freezing point.

Since the wet-bulb temperature is the temperature of evaporation, it is not possible by ordinary methods to cool water at a cooling tower to a temperature below that point. Theoretical limits are seldom attained so that usually the water is several degrees warmer than the wet-bulb temperature of the air. With a wet-bulb temperature of 60° F., assuming that the water be cooled only to 67° F., and that its temperature be increased in passing through the pipe line by 5° F. it would reach the underground plant at 72° F. and would be of little benefit in cooling mine air. Overcoming

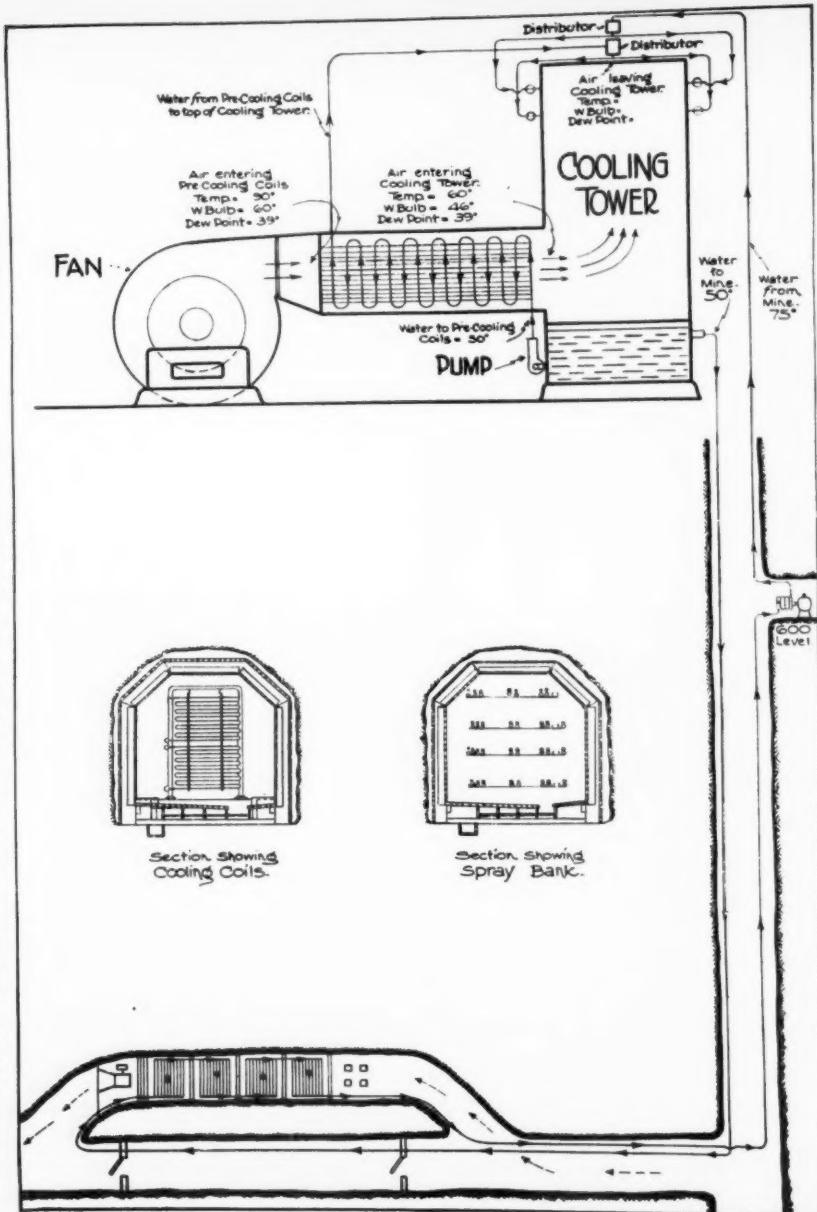


FIGURE 1.—Diagrammatic representation of ventilation system.

this summer difficulty was accomplished by devising a process that makes it theoretically possible to cool the water to the dew-point temperature which, as has been noted, on a warm, clear day may be 20° F. below the wet-bulb temperature.

Water Cooled to Dew Point

The main features of the equipment needed for this purpose are shown on the diagram Figure 1, and are the cooling tower and a heat absorber over which the air is passed and pre-cooled before it reaches the tower. Two closed circuits of water circulation are used. In one of them the warm water returning from the mine is delivered to the top of the tower, and after being cooled falls into the sump, from which it passes through the main pipe lines to the mine and in

return back to the tower. In the other closed circuit, water is drawn from the sump by a pump and forced through the heat absorber in the air duct leading to the tower, and thence back to the top of the tower, and after being cooled to the dew point.

To effect the pre-cooling of the air before it reaches the tower, without changing its water vapor content, the heat absorber is constructed so that the heat exchange between air and water is effected by contact of the air with a large number of copper plates that are maintained at a low temperature. Essentially, the heat absorber is composed of a number of copper pipe coils upon which the copper plates are mounted. Water from the cooling tower sump circulates through the copper pipe coils in a direc-

tion counter-current to the flow of air and by contact between the pipes and the copper plates the plates are cooled. In this manner both sensible and wet-bulb temperatures of the air are lowered, but the temperature of the dew point is not changed.

Since heat is abstracted from the air by the water at the heat absorber it is evident that it must be returned from water to air in the cooling tower. From this it would seem that no real advantage is gained. However, when the air is heated in direct contact with the water at the cooling tower its water vapor content is increased by the evaporation of some of the water. Thus the heat of the air, when raised through a given temperature range in this manner, is increased both by the change in sensible temperature and also by the latent heat of evaporation of the increased vapor content. In cooling air through the same temperature range by indirect heat exchange, at temperatures above the dew point, no change in water vapor occurs. Thus the heat removed from the air by this indirect heat exchange is limited to that required to effect the change in sensible temperature and is considerably less than is absorbed by the air in direct contact with water. The difference between heat indirectly absorbed from the air and directly imparted to it with accompanying evaporation, is then available to cool the water from the mine at a lower temperature range. The process is regenerative and it is evident that the theoretical lower temperature limit to which the water may be cooled is the dew-point temperature.

Plant Designed for 50° F. Water in Summer

The tower now in use was designed to deliver water under average summer conditions at 50° F. The best performance was obtained on a day when the sensible temperature was 92° F., wet-bulb temperature 62° F., and under these conditions the water was cooled to 48° F. During the past month of July, the warmest month of the year, the average temperature of the water delivered to the mine line was 48.2° F.

Experimental Plant at Mountain Con Mine in 1931

Experimental work upon the development of this plan was started in December, 1930, and the first experimental underground plant was installed on the 3,200 level of the Mountain Con mine in October, 1931. At that time the high-pressure lines for closed-circuit circulation of the water were not available, and the plant was operated by means of water drawn from the city supply system, cooled so far as possible by a spray system, and, after use, discharged into the mine drainage system. Since then a number of similar low-pressure plants have been used almost continuously. Pipe lines for closed-circuit circulation of the water were completed in March, 1936, and an accompanying high-pressure air-conditioning unit on the 3,500 level of the Mountain Con mine at the

same time. The cooling tower, however, was not then completed, and was not available until August, 1936.

Will Equal Melting of 800-1,000 Tons Ice Daily

The present underground plant was designed to cool the mine air from 80° wet bulb to 65° wet bulb, under average summer conditions. It has been effective in cooling a volume of air ranging from 55,000 to 65,000 cu. ft. per minute through a wet-bulb temperature range varying from 13° to 23° F. at different times of the year. For air conditioning the whole mine it is planned to cool from 250,000 to 300,000 cu. ft. of air per minute through a 15° F. wet-bulb temperature range. The cooling effect thus developed will be approximately equivalent to that caused by the melting of from 800 to 1,000 tons of ice per day. For this it will be necessary to circulate 800 to 1,000 gal. of water per minute, and the main pipe lines that have been installed are large enough for that purpose.

The total volume of air to be reconditioned is considerably larger than that now circulated through the mine, and plans for the future include the recirculation of conditioned air from the cooling plants through near-by workings and back to the plant. By this method approximately 75 percent of the air passing through the plant will be recirculating, and about 25 percent will be drawn from an intake air source. A plant has been run with only 10 percent air from outside sources without undue depletion of the oxygen content or accumulation of carbon dioxide.

When the first experimental plant was put into service in 1931 the air reaching the plant had an initial temperature of 82° F., wet-bulb temperature 80° F., and it was discharged from the plant at a temperature averaging approximately 65° F. saturated. After about five months' operation the general cooling and recirculation caused the temperature of the air reaching the plant to drop to 80° F., wet-bulb temperature 77° F. As stated, the present underground unit was designed to cool air from 80° wet bulb to 65° wet bulb, but since it is the only unit now operating it has been found most advantageous for the mine as a whole to use it to recondition air from bottom level development with little recirculation, and the air reaching the plant has generally had a wet-bulb temperature of about 85° F. Cooling through a 15° range with saturated air is more difficult at higher temperatures since the quantity of vapor to be condensed is greater. Starting at 85° and cooling through 15° F. with a volume of 60,000 cu. ft. per minute, approximately 5.3 gal. of water have to be condensed per minute, and more than 70 percent of the cooling effect is required to absorb the latent heat of condensation. The discharge from this plant has, therefore, been at a maximum of 72° F. during warmest summer days, and has dropped to a minimum of 59° F. during the winter. In this connection it is im-

portant to note that with the use of the large-size pipe line the velocity of water flow is slow and nearly an hour is required for the water to pass from the surface to the underground plant. As a result the temperature of the water is increased about 9° between the surface and the underground plant. At full flow this temperature loss will probably not exceed 4°, and this will improve plant performance.

Air at Working Faces Lowered Up to 20°

Lowering of the temperatures in the working places is naturally greatest at those places nearest the plant and is progressively less with increase in distance from the plant. With the initial experimental plant the temperature of some places was lowered as much as 20° F., or a general average in seven places of 18° F. sensible temperature, and 14° wet bulb. The present high-pressure plant replaces an old low-pressure plant of about 50 percent the capacity of the new plant. With this change the maximum improvement was from 90° to 78° F. at one place, or a general reduction for 14 working places from 86° sensible, and 83° wet bulb, to 80.5° sensible and 78° wet bulb. These results are appreciably affected by the 9° temperature loss in the water, and also by the fact that the plant is treating air having an initial wet-bulb temperature of 85° instead of the 80° wet bulb for which it was designed.

However, the air can be lowered to the same final temperature, or 65° F., no matter what the initial temperature, and the only difference in plant design will be an increase in the surfaces needed to transmit the heat, and a larger volume of water to absorb the greater heat of condensation.

Hope to Reduce Average Mine Air to 75°

Future plants will show some changes in design, and be of different sizes as required by different mining conditions. It is planned that the air discharged from these plants will have a wet-bulb temperature not exceeding 63° F. as an average summer condition, and when all units covered in this plan are in operation it is expected that the average mine temperature will approach 75° F. with 75 percent relative humidity.

Dust Also Removed

In reference to the removal of dust from mine air it may be said that this plant has under average conditions of operation removed about 46 percent of the dust in the air entering the plant. The efficiency of removal varies from a maximum of 75 percent with high concentrations during blasting down to a minimum of about 30 percent with low concentrations during periods of little activity in the mine. The geometric mean diameter of the dust particles at both intake and discharge was approximately 0.46 microns, so that fine particles were removed with approximately the same efficiency as the coarse. Number

(Concluded on page 55)



Central preparation plant at Wayland, Kentucky.

By

G. B. SOUTHWARD *

MODERNIZATION and MECHANIZATION at the ELK HORN COAL CORPORATION

THE Big Sandy-Elkhorn field of eastern Kentucky is, relatively speaking, one of the newer coal fields of the United States. In the early part of this century a branch of the Chesapeake and Ohio Railroad was extended up the Big Sandy River, reaching what is now Elkhorn City about the year 1905, and while a few mines were operated along the lower part of this river at that time, it was nearly 10 years later before the development of the field, as we know it today, began to assume proportions. The progressive policy of the Chesapeake and Ohio Railway in extending its lines, in modernizing its track and equipment, and in encouraging development by its service, has been one of the contributing factors toward bringing the high quality coals of this region to their present market position.

The Elkhorn Coal Corporation was one of the pioneer companies in this district and in 1913 construction was started on the mining plants at Wayland, Ky. These mines are in Floyd County on Right Beaver Fork—a tributary to the Big Sandy River. At that time the railroad was being built up this creek, but had not yet reached the point where the mines are located; consequently, during

the early months of construction the materials necessary for houses, tipplers, and other plant facilities, had to be transported by team and wagon a distance of 20 miles. The rugged country, together with the absence of good roads, made this an accomplishment whose difficulties are hard to realize today.

In the early part of 1914, the railroad had reached the plant location, and shortly after that the tipplers were completed and the mines were ready for operation and the first coal was shipped. Opening in a new field, these mines had no obsolete practices to discard and no local traditions to overcome—conse-



Portal of mechanized mine. Named in honor of "Colonel" Thomas S. Haymond, Member of National Bituminous Coal Commission and formerly General Manager of the Elk Horn Coal Corporation.

* Consulting Engineer, American Mining Congress.

quently, from the very beginning the methods adopted were the most modern of that period. Gathering locomotives, shaker screens, and cutting machines were used to mine and prepare the first coal produced from this operation.

In the 20-year period following their opening, the Elkhorn operations have kept abreast of the times in mining and preparation methods. Some of the earliest experiments in mechanized loading, both with mechanical loaders and conveyors, were made in this eastern Kentucky field. However, during the years of the depression, improvements were naturally retarded and it was not until about a year ago that it became possible for this company to take up the question of installing new equipment. Mr. Clarence W. Watson, now president of the company and its executive head at the time the first ground was broken, has, through his knowledge of the field and his faith in its future, brought about the present program of modernization.

Plans for Modernizing

In the latter part of 1936 plans to modernize and mechanize the operation of Wayland Mines were completed and began to be put into effect. These plans included a new tipple, new mine cars, and underground conveyors. The portion of the property selected for the mechanized operation was a large undeveloped acreage adjacent to the older mine workings but so situated that the new operation would be entirely separate from the mining in the older hand-loading section. This area had the further advantage of being close to the proposed new tipple and could be reached by its own main line haulage.

The coal mined is the Elkhorn No. 1 seam, which has a thickness of approximately 42 in. The top immediately over the coal varies from a sandstone to draw slate and cap coal. The thickness of the draw slate changes in different sections of the mine and there are areas where it disappears entirely, leaving a solid sandstone roof. In the present workings, the draw slate and some cap coal are present, and in most cases have to be taken down soon after the coal is mined, but prospect openings in advance of the present workings show an absence of draw slate and an increasing seam thickness. The main portion of the seam—42 in.—is for the most part clean coal, except that some small streaks of impurities, which are not constant, do occur occasionally but these can be picked out by hand at the face and at the tipple.

It was decided that the first method of mechanization would be conveyors with hand loading. There were two reasons for this decision. The first was that the height of the seam is suitable for conveyor mining and it would not be necessary to take down any top for clearance with this equipment. The draw slate above the coal is difficult to maintain except for short periods of time, and the fast rate of advancement with conveyor mining would make it possible to hold this roof in the rooms. The second reason was that the same amount of impuri-

ties that had customarily been picked out by the miner in the hand-loading section could be removed to an equal or better degree by the hand loaders in the conveyor section.

The plans for the tipple were for a steel structure located about 200 ft. from the old tipple. This location was selected as being central to a large area of coal, and the plant built there could serve as the central preparation plant for the several mines in this division of the company's property. The coal handling arrangement, as described in detail later in this article, followed the latest and most modern methods of screening, sizing, and de-dusting. For the present, mechanical cleaning was not included, as the past history of the company indicated that the impurities in the seam could be removed at the face and by hand picking on the tipple, and produce a high quality coal with a low ash content. The design, however, is so arranged that mechanical cleaning can be added in the future if the need should ever arise.

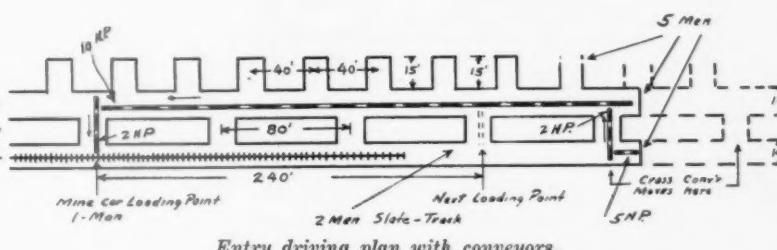
In line with the present trend for large mine cars, the new design selected for this operation is an all-steel type with a capacity of 122 cu. ft. level full. This has an actual capacity, with conveyor loading, of more than 4 tons. The overall dimensions of the car body are

7 ft. wide by 12 ft. long, with a total height of 27 in. above the rail. The wheels are cast steel with Timken roller bearings on stub axles, and the car has a spring bumper at one end and a wood block cushion bumper at the other. A special feature of this car is a gate at the loading end, hinged at the floor of the car so as to swing inward. This is to provide a means for loading through the end of the car, instead of over the side, which will be a particular advantage for mechanical loading. Five hundred of these cars were purchased from the American Car and Foundry Company and constructed at the Huntington plant.

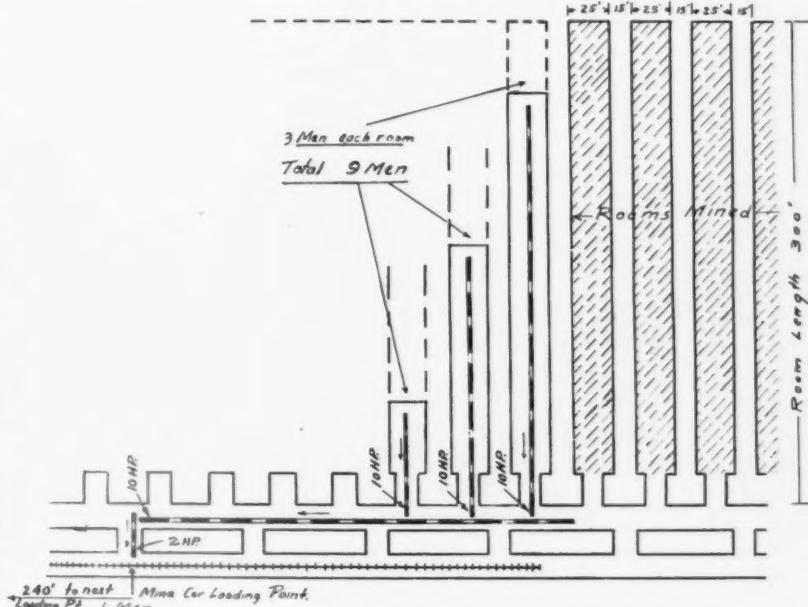
Description of Conveyor Mining

The new mine was opened by three main entries which started from the outcrop. Work on these openings was begun in December, 1936, and by the middle of January, 1937, the two main entries had been driven into solid cover, about 100 ft. underground. At that point the first conveyors were installed and the accompanying map shows the development which has been made entirely with conveyors since that time—a period of eight months. From the beginning this mine has worked all units on three shifts.

The first unit was used to drive the three main entries, and as the develop-



Entry driving plan with conveyors.

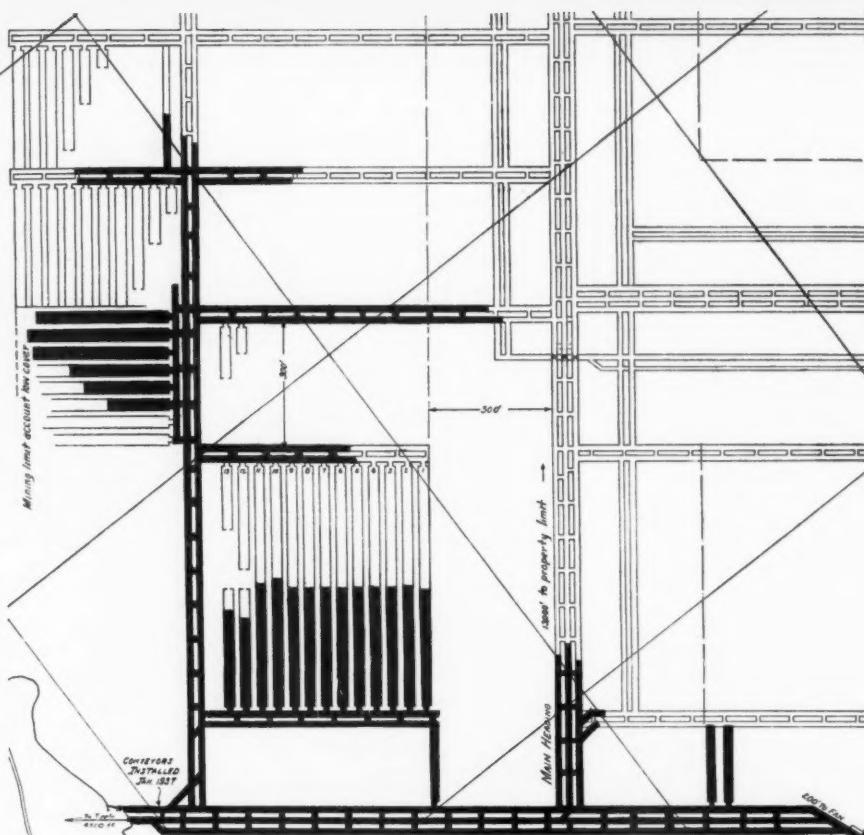


Room mining plan with conveyors.

ment advanced, additional units were added—for the butt entries and for the rooms. There are at present five conveyor batteries operating—three are driving entries and two are mining rooms. An entry battery advances either two or three headings simultaneously and a room battery works three rooms; each battery is a complete unit with its own loading point. The conveyors are the drag-chain type, electric driven, furnished by the Jeffrey Manufacturing Company, and the mine cars are moved at the loading points by Brown Fayro rope hoists.

The present operation, as shown on the map, is working a small territory adjacent to the outcrop, while the main development is advancing into the body of this property. To some degree the room work in the first panels is for the purpose of determining what are the proper and most economical dimensions for the room and pillar widths. The practice in the hand-loading section over a long period of years has been to make drive rooms a maximum of 18 ft. wide, with pillars varying from 30 to 80 ft., and to recover room pillars. With conveyor rooms it was decided to make the maximum extraction on the first mining and to eliminate pillar recovery.

To test this plan, the first rooms were driven 25 ft. wide to see if this width could be maintained. In order to prevent any adverse roof action, due to the weight of the over burden, the first room pillars were made 15 ft. wide. It was the thought that if this proved successful, the latter plan would be to increase the room width and decrease the size of the pillar between the rooms. The operation so far has shown that a 25-ft. room width with conveyors can easily be main-



Conveyor mine workings, January to September, 1937.

tained, and this width can probably be extended to as much as 35 or 40 ft. Also, the indications are that the pillar width can be decreased to 10 ft. or less; consequently, a high percentage of extraction is expected in the future room panels.

Description of Preparation Plant

In February, 1936, the tipple plans were completed and construction was started, and by the middle of August the

structure was completed with the screens and coal handling facilities installed and first coal dumped. In the meantime, the new mine cars had arrived and these were put into service—hauling from the conveyor mine to the new tipple. The operation of the old tipple was not discontinued until September—after the new tipple had passed through the period of testing and adjustment.

The tipple was built by the Fairmont Machinery Company, Fairmont, W. Va.,



Loading onto conveyor at face.



Conveyor loading a trip of cars.

and is an all-steel structure with concrete floors. Its capacity is 600 tons per hour with screening and sizing facilities for loading various sizes and combinations onto five railroad tracks. Four of these tracks are equipped with loading booms and the fifth track—for smaller sizes—is loaded from a chute.

The dump, furnished by the Link-Belt Company, is a rotary type electric driven and will handle two mine cars at one time. The cars are fed on and off of the dump by a drag-chain feeder which engages the car bumper. Both the dump and the car feeder are operated by push-button control. The coal goes from the mine cars into a weigh-basket; the weights are registered by a set of Fairbanks-Morse recording scales. At the side of the scale there is a numbering keyboard on which the weighman, by punching the keys, prints the car check number on the same tape which records the car weights.

The slate cars from the mine are not uncoupled from the trip. These are dumped at the rotary dump and, through a fly-gate, the slate is discharged onto a conveyor which takes it to the refuse bin. From there it is dumped into a car which is hauled by a skip hoist to the dump at the top of the hill behind the tipple.

From the weigh-basket the coal is discharged onto an apron conveyor which leads to the head of the main shaking screens. When desired, the coal can be by-passed onto an inspection table and after inspection is discharged onto the main conveyor.

The shaker screens are 10 ft. wide and 70 ft. long and make 4 sizes (ordinarily plus 6 in., 4 in. x 6 in., 2 in. x 4 in., and minus 2 in.). These sizes can, of course, be varied as desired and can be discharged directly to the railroad cars from the loading booms or onto remixing conveyors, which permits any number of combinations of the usual screen sizes. At the end of the loading booms, there is a chute, operated by compressed air, which can be raised into position so as

to discharge the coal backwards into the railroad car to the rear. This eliminates the necessity of stopping the screening operation when a railroad car is loaded and an empty is being dropped under the loading boom.

A feature of the main shaking screens is the floating drive designed by the Fairmont Company. This suspends the drive in such a way as to eliminate vibration in the tipple structure. The picking tables are lighted by mercury vapor lamps which have the quality of showing very vividly any impurities

in the coal, and insure clean preparation before the product goes into railroad cars. The slate which is removed from the picking tables is thrown onto a conveyor which takes it to a bin where it is automatically weighed before passing to the main refuse conveyor. In this way an accurate check is kept on the quality of the coal loaded underground and each section of the mine can be checked separately and accurately by this device. All tracks are equipped to treat all grades of coal with Dustlix, applied through a high-pressure spray system, as a dust preventative.

The products from the shaking screens can be diverted to crushers instead of going into the railroad cars. The primary crusher, furnished by the Jeffrey Manufacturing Company, is the roll type, 36 in. x 46 in., driven by a 150-hp. motor. The oversize from the roll crusher goes to a 100-hp. ring crusher. The crushed product passes to a battery of 7 vibrating screens—2 primary and 5 secondary. These vibrating screens were furnished by the Robins Belt Conveying Company. The coal from the

vibrating screens, through a system of conveyors, can either be remixed with the other screen sizes in the blending plant or can load directly into the railroad cars.

At the picking tables, any soft or shattered lumps which have passed over the screens are picked out and sent to a small 18-in. x 18-in. single roll crusher, driven by a 7½-hp. motor. The product from this crusher goes to the vibrators.

Further Plans

The new tipple, the new mine cars, and the conveyor mining constitute the first phase of the modernization and mechanization program for this company, but it is not necessarily the idea that the improvements will stop at this point. Trials and experiments with track-mounted cutting machines, with mechanical loaders, and with different types of explosives are now under way and it is the intention to continue these experiments until the best way has been found to mine the coal at the lowest cost and to prepare a product that will satisfy the most rigid market requirements.



Shaking screens (during construction).



Face prepared for shooting.



Vibrating screens.

The Effects of Local Laws on Coal Cleaning

By R. W. ARMS*

LOCAL laws, whether they be of a state or a municipality, are essentially the expression of a public protest against some condition or circumstance regarded as objectionable. The laws which affect coal cleaning are mostly of the don't variety such as "Thou shalt not pollute thy neighbor's creek" or "Thou shalt not vitiate the air he breathes." Such admonitions are natural and result from the basic desire of men to preserve life and health. Even though certain restrictions on mining practice do not achieve the dignity of a section in the legal code, they are present none the less, because of public dislike for certain features embodied therein. Therefore, the trend is towards cleaner coal handling plants, inside and out, whether demanded by law or not.

Laws Regulating Ash and Sulphur

Some of our lawmakers, in the effort to secure an entirely meritorious result, have specified means for accomplishing that result which are, to say the least, open to question. They have ruled, in effect, that you must burn coal without smoke, and to do this you must have coal containing so much ash and sulphur. The primary motive was to prevent smoke; but there are many who believe that the secondary specification, that pertaining to the fuel used, robs the law of much of its effectiveness. For example, if a user of coal observes the letter of the law and buys washed coal within the specified ash and sulphur, he may quite properly hide under the protection of the law itself and claim immunity even though its use produces smoke.

Examining one of these laws in a cursory manner one finds that the coal must be washed if it exceeds a certain amount of sulphur, but the law does not state anything about what the sulphur shall be after washing. As it happens, this particular law is in effect in a district where the prevailing sulphur in the coal is not greatly improved by washing, and in a few rare instances is actually increased by the removal of a low-sulphur fire clay or shale.

Some legal-minded individuals say that

* Roberts and Schaefer Company.

it is unconstitutional to legislate toward a certain effect and then specify the quality of raw material to secure that effect. They opine that it is as logical as requiring a steel of certain tensile strength, and demanding the use of 60 percent iron ore to make it.

Whatever the technical and legal aspect of the law may be, it is a step forward in the direction of more efficient and cleaner combustion. Undoubtedly as more data pertaining to this particular problem are secured, the codes will be revised to suit the needs of the case and the present apparent discrepancies will either be clarified or removed.

Furthermore, there are some effects of coal cleaning which definitely assist in smoke reduction. All coal cleaning processes, wet or dry, involve the removal of dust or sludge at some stage in the proceedings. It is proven that coal is easier to burn smokelessly if fines are removed. Also, the prevailing cleaning methods usually involve sizing of the coal, and the use of a rather definite and uniform size has been found helpful in controlling combustion and reducing smoke. The removal of any sulphur by cleaning is beneficial even if it fails to bring the coal down to a stated level, because it reduces the amount of the destructive oxides of sulphur in the atmosphere. The removal of ash itself may be regarded as more effective in improving efficiency of combustion than reducing smoke, but this very efficiency assists in the control of fires and in smokeless combustion.

Fly Ash

When coal is burned in the pulverized form there seems to be little doubt as to the lawmakers' wisdom in setting the lowest possible limit on ash and sulphur. The most distressing effect from the burning of pulverized coal is the fly ash blowing out the stack instead of remaining on the grates. Some of this fly ash settles quickly in the air and covers the neighborhood with a thin brownish film of dust.

The reduction of fly ash by coal cleaning is much more complete than at first appears. For example, consider the case

of a coal of 10 percent ash which can be improved by coal cleaning to 8 percent ash. The objectionable fly ash is reduced far more than the indicated 20 percent, because most of the material removed by washing is slate. All of this, when pulverized and burned, forms tiny glazed particles heavy enough to settle near the point of production. The remaining ash in the coal is largely of the inherent variety, so intermingled with the combustible elements of the coal particles themselves, that upon burning, its identity as a particle is lost, and it shatters into extremely fine ash fragments almost molecular in size. Material of this fineness does not settle but is carried away by the slightest of air currents and spread over such a wide territory that it ceases to be a nuisance and is eventually washed from the air by rainfall.

Municipal Smoke Regulations

Long before the above ash and sulphur restrictions were considered, many of our large cities, especially industrial centers, had their civic pride aroused by the frequent allusions to their communities as "smoky" or "dirty." Instead of inventing alibis or casting about for some smokier places on which to shift the onus, they made a concerted effort to find out what could be done to minimize smoke and soot. They formed commissions and appointed engineers to investigate the situation, and in a short time opened up the whole subject of combustion to a critical analysis. It was soon found that there was no real necessity for the excessive amount of smoke which had previously been tolerated. Volumes of data were secured on fire-box designs, types of coal, methods of firing, accessory apparatus and other aspects of the subject. The result was that a long list of rather simple rules was laid down, which, if followed, would substantially reduce the amount of smoke produced. The information gained was so broad in its scope that very rarely was a fuel consumer forced to spend excessive amounts to correct his procedure. In many cases smokeless combustion was a real boon to the consumer as he found that this efficient burning saved fuel.

Following the success of this research, municipalities soon began to pass smoke prevention regulations, and a real improvement was effected in the condition of the cities.

Such regulations as these had an important influence on the quality of coal made in cleaning plants. They were the cause of the introduction of specific sizes known as "stoker" sizes, which could be more easily burned, with a minimum of smoke. The cleaning of the coal goes hand in hand with the sizing, however, and there seems to be an increasing demand for stoker sizes which are cleaned as well as screened.

Enforced Efficiency

Laws requiring the washing of coal may have a more important effect in industry than the lawmakers themselves visualized. They may be the instruments by which the users of coal are forced to do what they previously should have done, to their own benefit. No one will deny the increased B.t.u. value of clean coal, and many figures are available to prove that the cleaning of coal is worth all it costs. However, the users of coal, as a group, are reluctant to pay any increased price for washed coal, and the shippers are not to be blamed if they hesitate to install washers when they themselves must absorb much of the washing cost. All of this uncertainty about the value of washing would be removed if a way could be worked out to evaluate coal on a B.t.u. basis. After all, with few exceptions one buys coal for its heat value just as certainly as he buys iron ore for its iron content and zinc ore for its zinc. The metals all have an established value, quoted daily in the market centers, fluctuating in response to business balance, but always the same in any given period to all shippers. The metallic ores are paid for on the basis of their metallic content, less penalties for deleterious substances, and plus certain bonuses for ores of chemical compositions that assist in smelting. The producer of metallic ores is seldom at a loss to know whether it will pay him to wash or mill his ore before sending it to the smelter, as the factors in his problem are fairly well known. He simply balances the costs of milling against the greater revenue and freight-saving by shipping concentrates, and the result usually is a definite indication of one or the other. By such a comparison it would seem to be of tremendous advantage if B.t.u.'s could also be quoted daily on the markets, if excessive ash and sulphur could be penalized on a uniform basis and suitable bonuses be allowed for special qualities of the coal. This method of fixing the intrinsic worth of coal would eliminate some of the variables which are so often included in the problem of evaluation. Volatile matter, fixed carbon, coking quality, phosphorous, fusion temperature of ash, and other attributes of the fuel would not enter into the calculations of coal value, but would be regarded as designations of fuel types from which the coal user could make his choice. After eliminating all unsuitable coal types and making his se-

lection, the value of the coal would be figured from the B.t.u. rating with proper penalties and bonuses. Similar rejection of unsuitable types also has its counterpart in the metal fields, as some smelters require basic ores to assist in fluxing while others feel the need of the siliceous types. The basis of valuation, however, is always the metal content.

Perhaps the above speculations appear to be off the subject, because laws regulating ash and sulphur will not necessarily bring about a uniform method of evaluating coal; but they will provide an opportunity for a given district, more or less committed to the use of its nearby coal, to secure valuable data on the actual increase in worth of this coal after it is washed. Reliable figures such as these are important steps toward uniform evaluation.

Letter of the Law

When a law-abiding citizen finds himself regulated or prohibited in some manner, his moral code adopts the exact



R. W. Arms

wording of the regulation or prohibition, and he walks blithely just inside the prescribed boundary and feels himself an outlaw if he steps over the line. He no longer follows the more flexible dictates of an unfettered soul. Similarly, in districts where the limiting ash of coal is legally fixed, the shippers immediately take steps to come within the letter of the law by the least painful means. It is to be expected that the technical accomplishments under such a system will not always be complete; but the intent of the law is wholesome and the taking of this one step will certainly lead forward to a re-statement of the limits which will be found to be more equitable.

Washeries and Stream Pollution Regulations

For many years there have been local laws against stream pollution from washery residues. These have been directed against purely local stream pollu-

tion because of some nearby condition which made it necessary to apply the regulation. However, there is now pending some Federal legislation intended to restrict stream pollution, which has a direct effect on coal cleaning. Here again, the underlying objective is perhaps wholesome in that it will supply a curb on promiscuous dumping of objectionable substances into streams. However, the method proposed by the Government is not at all pleasing to the mining industry for the reason that it is much more likely to create hardship for mine operators than it is to produce any useful results to others.

Coal washing sometimes entails a certain amount of sludge or muddy water, which must be rejected via the streams. The only alternative involves expensive settling tanks, filters and other complicated equipment. Coal cleaning at best is not a self-sustaining art. That is to say, it is unusual to find an instance where the operator realizes any extra return for his coal over the full cost of cleaning it, especially when the material rejected in the cleaning is properly evaluated. Yet, the economy and universal benefit of coal cleaning is seldom contested. Therefore, it would seem to be poor national policy to put any hindrance in the path of the wide-spread adoption of coal cleaning just because of a relatively small amount of stream pollution. Certainly the minute quantity of solids added to the small creeks usually found adjacent to coal washeries is a lesser evil than the millions of tons of extra refuse shipped with unclean coal. This incombustible material is moved to the cities and points of combustion, increases fly ash, smoke and fumes, and eventually adds to stream pollution at densely populated centers rather than at the sparsely populated areas in the vicinity of the washeries and mines.

Dust Prevention

Lately, because of the increasing activity in processing the fine sizes of coal either by screening, by cleaning, or both, the amount of dust thrown into the air both inside the tipples and out has increased greatly. Formerly the dust created by the screening of a few sizes was regarded as a necessary evil and no attempt was made to suppress it; but now the separation of sizes has been carried into the fine meshes, and the handling of the dust becomes one of the major aspects of the design of a modern processing plant. Laws are now appearing which are intended to protect the workmen in these plants and also to prevent dust from entering the ventilating shafts of the mines. Manufacturers have kept pace with these requirements and have produced equipment to handle dust and prevent dusty atmospheres. If an operating company finds itself justified in building an elaborate coal processing plant to screen and clean all sizes down to fine dust, it will discover that for very little additional cost it can confine dust completely and have a much cleaner plant than was deemed possible before the fine sizes were made.

Some Coal Preparation Problems

Solved at the Face

THE cost of coal preparation has increased during recent years with a proportionately greater rapidity than have other problems confronting the coal producer. In this connection, perhaps a revised improvement of the original lower cost method of cleaning coal may be efficiently and practically applied in more instances than some producers of coal realize.

The increase in demand for prepared stoker coal is proportionately greater than for other grades, and the consumer of screenings objects strenuously to excessive or concentrated fines. In this connection the coarseness of machine cuttings from clean coal play a prominent part.

About the time the "Trail of the Lone Pine," of Blue Ridge Mountain fame, aroused interest, men with foresight were buying the coal land in the same vicinity. At the start of mining there, the coal from this area was recognized by the consumer as ranking among the foremost in quality, and, during the past 25 years, it has retained the distinction. The reason for mentioning the particular region is due to the fact that it was there that the revised method of coal cleaning at the face was first introduced.

The revised idea consists of reducing to the very minimum the amount of impurities loaded with the coal in the mine. Prior to that time, coal cleaning at the face depended principally upon the inclination of the human element involved.

Principal interest, of course, attaches to that which is new at present; but the new ideas in coal cleaning at the face, introduced in 1912 at the terminals of the C. & O. and L. & N. Railroads, in Letcher County, Ky., by the Consolidation Coal Company and the Elk Horn Coal Corporation, are new at present in some parts of other coal fields. The terminals are separated only by a mountain, and are thus in close proximity so that the coal seams involved are practically the same on both sides of the mountain.

Many coal producers doubtless are familiar with the methods employed in those seams, and during the intervening years those methods have spread to other fields. Unfortunately, bituminous seams of the same quality and thickness as

By C. T. POSTEN *

those originally mined near the named terminals have diminished.

Operators must now extend railroads or be content to mine thinner veins. The extent of application of the newer methods of coal cleaning at the face to thinner veins becomes a question. Let us review the methods as applied to thick veins and then illustrate one or more examples of application to a thinner seam.

In the location of the thick vein of our discussion, the minable vein is composed of two thinner seams with a variable parting separating the two. The two seams are known as Elkhorn Nos. 1 and 2, the No. 2 being above the No. 1. The parting varies in nature and thickness, and the total minable vein also varies, but averages about 7 ft. thick. The roof is slate and of such nature as to cause difficulty in the mining operation. Rash of varying thickness appears next to the pavement, and the pavement is scaling or soft.

The mines are worked by the 80-ft. block system. Arcwall machines are employed to cut the parting of slate or shale when possible. In the instance of thick

rock parting, the machine cuts just below the rock. The rock is then broken up by explosive and the machine is employed to drag the broken rock from the cut. In either instance, by means of a hand scraper, designed for the purpose and furnished by the company, the cut is scraped clean by the loader, and the cuttings and other particles of the parting loaded for refuse disposal. By means of a heavy broom, furnished by the company, the cut, the face of the coal, and the pavement for a space of 12 ft. back from the face is cleanly swept by the loader.

In the top bench of coal the holes for shooting are bored as near level as possible and in such manner as to finish about 14 in. from the roof. This is for the purpose of leaving permanently 14 in. of coal to support the roof.

The holes for shooting the bottom bench are bored as near level as possible, and so as to finish about 5 in. from the rash, or from the bottom in case there is no rash. The holes are so bored in order to leave coal on which to shovel the principal part of the bottom bench when shot.



Supervision of cleaning at Face at Reynolds Mine, Black Bank Coal Corp., Olcott, W. Va.

*Coal Preparation Engineer, Dickinson Fuel Co., Charleston, W. Va.

Boards are then placed upon the pavement for a space of about 6 ft. adjacent to the face. This is for the purpose of preventing contamination of the shot coal with extraneous impurities from the pavement. Sawed wooden ties are placed within the kerf made by the machine, along the ribs and the back, these to prevent slate at the edges along the cut from being broken loose with the coal. Before any shot is allowed to be fired, inspectors, employed for the purpose, make sure that all requirements are met in connection with the proper preparation of the place. Thus, the variation introduced by the human element is minimized, and the possibility of considerable extraneous impurities being loaded with the coal becomes remote.

Figure 1, showing the face of a working place in the Black Band seam at Olcott, W. Va., illustrates the application of these methods of coal cleaning at the face in thinner veins. The scraper, used in cleaning the cut, lies on the floor in the foreground of the picture. Although seemingly all clean coal, the section contains impure bands, and considerable cost is involved in producing marketable coal from the seam. The section in detail is as follows:

Firm roof
5 in. soft coal
7 in. bone, high in ash
23 in. firm block coal
1 in. slate
6 in. coal
Slate pavement

Entries are driven 18 ft. wide, and rooms are driven 30 ft. wide, according to the "no pillar" system. The cut of the machine includes the 1 in. of slate, so disposal of the cuttings must be made as refuse. The cut must be made clean. In this connection, no cut can be entirely cleaned with the long handled, flat shovel commonly known as the "bug dust shovel." Such a shovel is advantageous for removing the principal residue from the cut, but the use of the scraper is imperative to the final cleaning. After the cut is carefully cleaned by the scraper, the cut is swept as far as possible with the broom. The pavement is then swept for a space of 8 ft. back from the face.

The bore holes are properly placed for shooting the coal down with a minimum amount of explosive. An extremely slow speed explosive is used to break the coal and bone down with a minimum amount of fracture of either. The soft coal is then carefully worked off of the bone coal as far as the loader can reach. The bone is likewise worked off the block coal as far as possible and gobbed in a pack wall. The block coal is then loaded up to the remaining bone, and the first removal operation repeated until the cut coal is entirely loaded.

Inspectors, employed for the purpose, see that the place is properly prepared before the coal is shot. As a general rule about 80 percent of the number of coal loaders will follow instructions in connection with coal cleaning. Disciplinary methods are essential for the other 20 percent. Violators of coal cleaning



Clean Coal in transit from Olcott, W. Va.

Comparison of coal and ash resulting from combustion. Dixport Mine, Dixport Coal Co., Cinco, W. Va.



rules are detected by a picking table, commonly called the "jury table." Such violators are disciplined according to contract.

Seldom do thick bituminous coal veins of extremely low ash and sulphur content occur without being traversed by one or more bands, or partings, of impurities. Thinner bituminous veins with inherent extremely low ash and sulphur content, and no extraneous impurities within the seam, are more frequent.

The so-called "clean" seams present problems of preparation. For descriptive illustration, consider the 38 in., clean seam of No. 2 gas coal at Cinco, W. Va. This coal, as shipped, is comparable in characteristics and quality to the Elkhorn coal as shipped. By the comparison of preparation of the two seams at the face, it is possible to show that virtually all methods of elimination of stratified extraneous impurities are related to the first detailed description. In the instance of the seam at Cinco, draw slate between the coal and the main roof makes it imperative that the holes for shooting be properly placed so that the force of the explosive does not fracture the draw slate. The draw slate is taken down as soon as the coal from the cut is loaded out.

The placing of the holes requires the same restrictions as does the placing of the holes in the top bench of the Elkhorn seam. It is obvious that the seam at Cinco is cut near the pavement, and the cuttings are loaded for shipment. Therefore, the maintenance of protection from extraneous pavement impurities to the principal part of the coal, as loaded from the cut, by utilizing a layer of unbroken coal, embodies essentially the same principle as that of protection from rash or bottom slate in the Elkhorn seam. However, the unbroken coal of the Elkhorn seam is left by the action of the shots,

whereas in the case of the Cinco seam the unbroken coal is left by the machine. Again, if the machine at any time is not properly controlled in cutting in the coal, it may touch the pavement, making the cuttings contaminated with slate. In this instance the cuttings must be handled as refuse and the cut cleaned in the same manner as that described for both the Elkhorn and the Black Band seams.

It is evident that machine cuttings contain more fines proportionately than does shot coal. If bits in the cutter chain of the machine are not properly spaced and if they are allowed to become dull, excessive fines result in the cuttings. Such cuttings, mixed with other screenings, cause critically unfavorable reaction from the consumer. At Cinco, a series of screen tests, with hand screens, of cuttings from different sections of the mine, emphasized the importance of constant maintenance of sharp bits. Patent bits, recently introduced, are found advantageous in this respect.

In conclusion of this short discourse upon but two of the phases of the many features of coal preparation, the fact is confirmed that research and application of preparatory methods of coal are essential to one and all coal producers who enter into the race for a share of the coal sales.

Angus Scott Heads Westinghouse Line Material Activities

Angus G. Scott, formerly superintendent of power distribution for Cleveland Railways, has been appointed manager of line material activities for the Westinghouse Electric and Manufacturing Company. He will be located at East Pittsburgh.

Placing of Concrete by Pump

By PERCY G. COWIN *

A UNIQUE method of placing concrete in inaccessible and restricted places underground, that showed advantages over placing by hand or compressed air, was used in connection with a recent PWA project for the city of Little Rock, Ark. In the laying of a pre-cast concrete pipe line through the foothills of the Ozark Mountains about 40 miles west of Little Rock, it became necessary to carry it underground through tunnels at two points. Two tunnels were driven, each 6 ft. in diameter, one 1,068 ft. long and the other 1,465 ft., the concrete pipe was put in place and the space around the pipe was back-filled with concrete.

The driving of these tunnels presented no problem that would be of interest to men who drive headings in mines, except that for any over break made in the tunnel excavation, we were obliged to fill with concrete at our expense. To minimize such over breaks the following scheme was adopted. A hole was drilled with the jackhammer in the heading face on grade and line. A column was then set up on center line, from which an arm was screwed into the hole in the face. Another arm was then mounted, having the exact length that predeterminations had indicated would yield the precise circumference desired. A ring of holes was then drilled somewhat closer together than would normally be used. Inside of this an ordinary pyramid cut was made.

Our problem was the placing of concrete as far as 740 ft. from each portal. A very careful study of methods was made, as the restrictions in size made it impossible to do this work by hand. After examination of the tunnels in the Minneapolis sewerage project, it was decided to use a pumpcrete gun which works almost like a reciprocating water pump except that the valves and plunger are especially designed for handling concrete. This pump is manufactured by the Chain Belt Co., and is known as their 160 pumpcrete. The procedure for concreting at each portal was to concrete the track in on line and at such a grade as to allow 6 in. of space between the track and the bottom of the pre-cast concrete pipe which was placed in the tunnel.

* Salmon & Cowin, Inc., Birmingham, Ala.

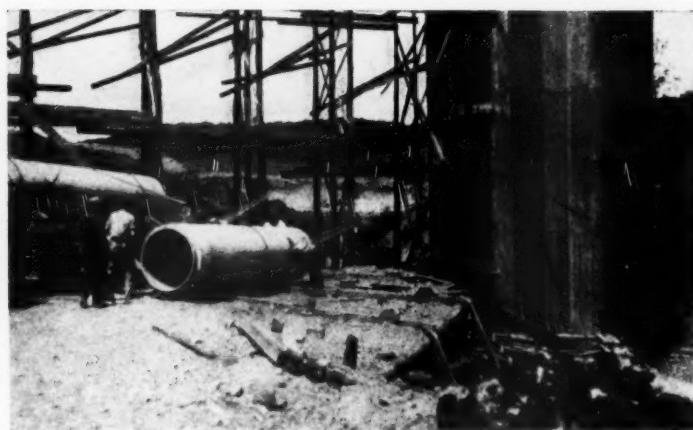


FIGURE 1.—Unloading concrete pipe near terminal portal.

Our routine consisted of having the afternoon crew unload the pipe and snub it down to the track grade at the tunnel portal where it landed on a larry, which gave us the correct height above the track so that the pipe would pull into place when carried into the tunnel. This crew, then taking one pipe at a time, pushed it into the tunnel, and made the connection to pipe already placed by pulling it home with a chain block while it was still on the larry. By means of a short rope sling under the rear end, and jacks on either side of the track, the pipe was lifted sufficiently to pull the larry out, and the free end of the pipe was then jacked on to line and grade and blocked securely to prevent pipes floating or moving. This crew placed from 60 to 96 ft. of pipe on the afternoon shift.

Fig. 1 shows the pipe being unloaded and the guides by which it was lowered to the track at the tunnel portal.

Concreting

Our concrete equipment consisted of a batching hopper (it was necessary that the aggregate be weighed), two 2-yd. truck mixers, the pumpcrete gun which was located near the portal, and a 6-in. concrete discharge pipeline which was laid in a ditch to one side of the track along the tunnel.

Our procedure was to load the proper amount of gravel and sand in the trucks at the batching hopper, drive past the

cement house where water and cement were added, and drive on to the tunnel portal, mixing on the trip and discharging into a hopper above the pumpcrete machine. From this hopper the concrete was let into a re-mixing hopper directly over the pump cylinder, as shown in Fig. 2. It was then pumped into the 6-in. line to a point where the discharge line had an S-curve, which carried it over the pre-cast concrete pipe placed by the afternoon crew of the day before. A valve was placed at this S-curve, and a hose carrying air at 100 lbs. pressure attached to it. As the concrete reached this point, the air valve was opened at intervals, thus letting air into the concrete discharge pipe at 100 lbs. pressure, which shot the concrete through the slick pipe with a force similar to a cannon and backpacked the tunnel. The movement of the concrete was visible along the bottom of the concrete pipe. A man was stationed back where he could observe the concrete and give notice when it was filling up to the concrete discharge pipe. When it filled up, he would signal, and a 5- or 10-ft. section of the concrete discharge pipe would be removed from the line towards the portal from our air valve, and the whole slick pipe pulled back and the coupling of pipe remade. This had to be done very quickly, as the pump was shut down during this change.

The pumping mixture that was estab-

lished by the city engineers, which worked very satisfactorily, consisted of 2,583 lb. washed stream gravel, 1,743 lb. sand, and from 7 to 8 sacks of cement, with from 6 to 7 gallons of water per sack of cement. This gave a bulk measurement of approximately 36 cu. ft. It was imperative that the batches be uniform, have no free water, and be plastic; hence determinations of moisture in each pile of aggregate was necessary every morning. It was found that on the longer pumps a slump of from 5 to 6 in., which was obtained by adding more cement and water, was more workable and paid for the added cement. As the portals were approached, the amount of cement and water was decreased, thereby lessening the slump to approximately 1.5 in. at the portals.

This method of placing concrete in the restricted area of a small tunnel worked out very well after the experienced crew of local labor found that any delay in making changes would result in blocking the pipe by permitting the concrete to set. After the first few days of opera-



FIGURE 2.—Remixing hopper and pumppcrete machine.

tion, little difficulty was encountered from this cause.

The ease with which this concrete was placed justified the expenditure for this equipment. Lining of the tunnels was

begun on May 28, 1937, and the total length of 2,533 ft. completed by July 5, 1937. Tests on the line after completion showed the leakage to be less than 1 percent of the allowable leakage.

The Money System Of the Future

(Continued from page 15)

governments everywhere proceeded to levy an unjust tax upon the people, but all to no avail. Because the money system was basically deficient it eventually collapsed. Once again we have a chance to restore it, and restore it we shall if we but use the very instruments which nature has provided.

The Gold Standard will not do because it is a scarcity system. Managed currency will not do because it is a nationalistic system. Therefore, proceeding by elimination, guided by the experience which the test of time alone provides and never losing sight of our real objective which is the development of an economy of abundance based on a free system of sound money, I say to you that bimetallism will be the money system of the future for the following reasons: First, because as distinguished from printing press money, silver, like gold, has a real or labor value which makes it "sound." Second, because silver, as time tested a money metal as is gold. Third, because silver is peculiarly suited to the needs of masses of individuals of low estate and modest needs throughout the world. Fourth, because silver is already in the possession of countless peoples in many countries so that its remonetization at a fixed ratio to gold will automatically effect the redistribution of gold now rendered difficult by its concentration. Fifth, because by diffusing the sources of the production of basic money it will render monopoly impossible, and put an end to the manipulation of prices by the manipula-

tion of money. And, sixth, because if utilized in the money systems alongside of gold, the white metal will provide a volume of real money whose quantitative relation to the wealth that money measures will be more adequate than is the ratio of gold alone to all other forms of wealth. Whereas the gold standard is admittedly a scarcity system, bimetallism, by its greater quantitative adequacy, is the logical system wherewith to develop and sustain the economy of abundance which is the goal of our civilization, and which, today, is brought within reach thanks to numerous other human achievements throughout the structure of the economy.

As to the future of gold: on the principle that the laborer is worthy of his hire, the gold miner, like any other producer, is entitled to a fair profit. If he is wise he will not expect indefinitely to receive for his product a price which has no economic justification whatsoever, nor will he expect to be set apart from other producers to enjoy special treatment at the expense of the community. For if he does, he will see the price structure, unsound at its base, ultimately collapse and go the way of all artificialities.

This, gentlemen, is one man's opinion; it is his considered opinion; whether it is right or whether it is wrong, time alone will tell.

Neill Heads Worthington Engineering and Sales at Holyoke

Worthington Pump and Machinery Corporation announces the appointment of Mr. W. A. Neill as manager of engi-

neering and sales activities at its recently reopened plant at Holyoke, Mass. Mr. Neill, formerly manager of the corporation's Air Tool and Portable Compressor Division at Harrison, N. J., will have his headquarters at Holyoke, where the manufacture of portable compressors, rock drills, automotive compressors and vertical compressors is now underway.

Mr. Neill has been associated with Worthington since 1934 in charge of sales to the mining and construction fields.

Air Conditioning for the Ventilation of the Butte Mines

(Continued from page 45)

concentrations of the dust were determined by the standard impinger method except that quantitation was made at a magnification of 1,000 diameters by means of a micro-projector. Particle size distribution was made from Owens jet-dust samples at a magnification of 10,000 diameters by means of an oil-immersion objective and micro-projector. The plant was not designed with any idea of dust removal in mind and its efficiency in this respect can probably be improved if necessary.

The effect of the plant in revivifying the air cannot be measured alone in terms of temperature and dust removal. It causes a distinctly pleasant impression as to freshness when the air is encountered at places so remote from the plant that little benefit from lowered temperature remains.

Mechanization Trends

Reports of Coal Operators Committees

Extracting Pillars In Room and Pillar Mining

THE National Project Committee on Mining Systems has, for some time, considered the advisability of confining their studies to one particular phase of mining plans and have tentatively agreed to concentrate their efforts on pillar recovery methods. Final plans for the study will be made at the fall meeting of the Coal Operators Committee.

The following report is the first of several that the committee plans to have ready for discussion at their meeting.

This report covers a method of pillar recovery in a room and pillar system of mining. The retreating method is used; that is, the butt entries are driven to their limit and the rooms are started at the top of the panel. The rooms are 280 ft. long and 20 ft. wide, driven on 60-ft. centers, leaving a 40-ft. pillar to be recovered. The angle of the pillar line and the room length determine the number of pillar places on one butt entry, and the rooms are driven up in successive order so that the extraction of the pillar begins immediately after the completion of each room.

Seam Conditions

The seam, which is a coal of soft structure, is approximately 3½ ft. in thickness. The immediate top is slate, and the cover averages about 700 ft. The bottom is fireclay.

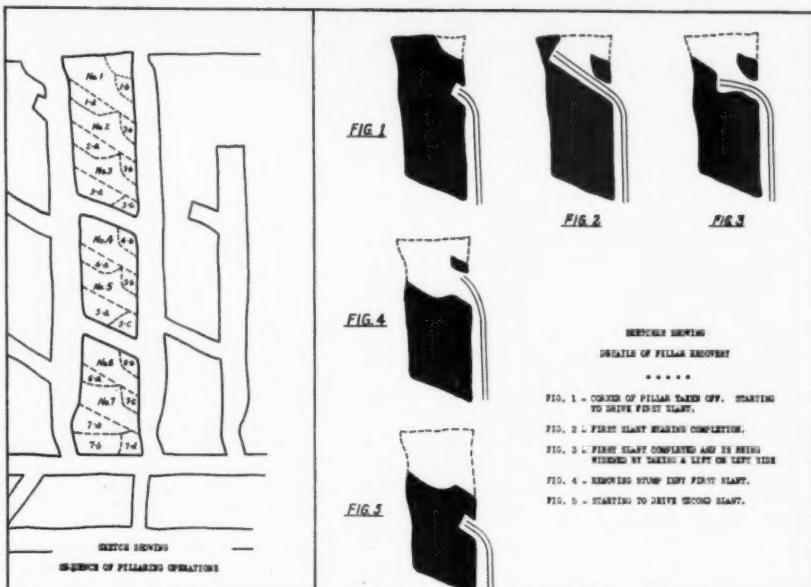
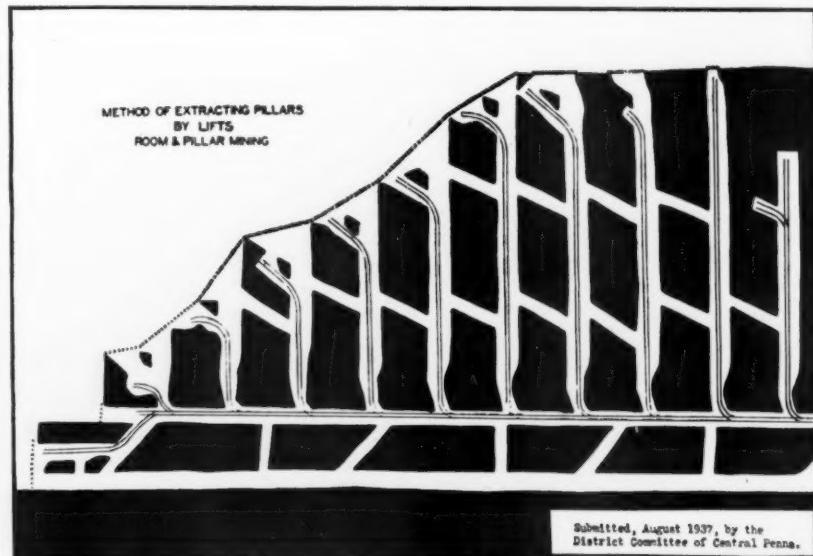
Recovery Methods

The details of this pillar recovery plan are illustrated by the accompanying sketches. These figures have been taken from the mine maps and are accurate in showing how the pillar recovery operations are actually carried on. The first illustration shows the pillar work on one butt entry with nine pillar places—eight room pillars and the entry stump.

The sequence of pillar recovery operations for one complete room pillar is shown at the left side of the second illustration. This shows the order in which the various portions of an entire room pillar are recovered.

Figures 1-5 in the second illustration show in detail the method of driving the slants, widening them, and then removing the remaining stumps. These stumps are left inby the mouth of the slant in each case to reduce the unsupported area and thus give maximum safety.

Submitted by the District Committee of Central Pennsylvania.



Room and Pillar Mining With Conveyors

General Description of Operation

THIS operation is a single room conveyor system with hand loading on the conveyors. The simplicity and steady production of this method are its outstanding features.

The rooms are 275 ft. long and 40 ft. wide, driven on 50-ft. centers. This leaves a theoretical 10-ft. pillar between the rooms. After the room has been driven up, this pillar is recovered by slab cuts, 7 ft. deep and 40 ft. long. This practically removes the pillar except for a small peg of coal left at the end of each 40-ft. slab. In advancing the room, crosscuts are obtained by merely taking one cut from the rib. This is done with no additional work or cost.

Seam Conditions

The sketch on the conveyor time study form below shows the typical seam section. The machine cut is made just above the lower binder, thus cutting out the upper binder, and the cuttings are

gobbed. The top bone is posted and remains in place nicely for the life of the room, which is generally 12 working days of two shifts each. The overburden averages approximately 250 ft. in thickness.

Equipment

The general arrangement of the equipment is shown on the accompanying sketch. The room and face conveyors are of the chain type. Other equipment consists of a shortwall cutting machine, an electric coal drill, a blower (to hasten removal of powder smoke), a slow-speed hoist, and a standard switchboard panel.

Operating Method

The room unit crew generally consists of five ordinary or four exceptionally good men. One of these is designated as the leader (invariably the cutter), another as the boom-man, and the remaining members as face men.

The faces are usually left in a cleaned-up condition. The first operation is then

the cutting, the cuttings being thoroughly removed and gobbed. Following the cutting machine, a row of face posts and necessary coal sprags are set, followed by the drilling, extension of the main conveyor, and the moving up of the face conveyor. The back timbers are then set and the shots prepared and fired.

The production per room unit in this seam is usually two full 40-ft. cuts or approximately 50 tons of merchantable coal. The pillar is extracted by cutting 40-ft. lifts and loading the coal directly on the main conveyor, the face conveyor having been removed when the advance work was completed.

Time Study

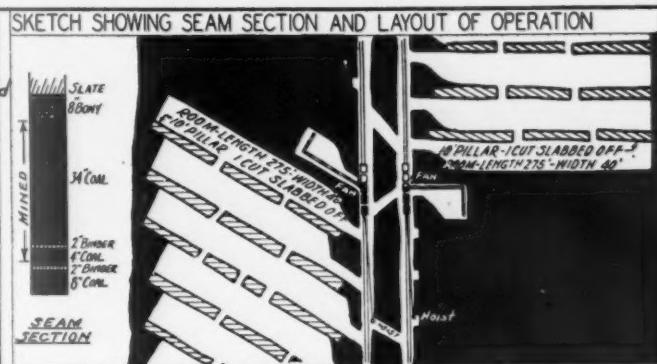
The time study shown below covers the performance of a five-man room crew during one complete shift, in which two clean-ups were made, producing 55.6 net tons of coal.

*Submitted by the District Committee
of Central Pennsylvania.*

COAL OPERATORS COMMITTEES
THE AMERICAN  MINING CONGRESS

Submitted, July 1937
By District Committee of Central Penn.

SUMMARY OF TIME STUDY			GENERAL NOTES ON OPERATION				
KEY TO CHART	MINUTES	PERCENT	TONS PRODUCED DURING TIME STUDY	556 N.T.			
C CUTTING	105	4.9	TYPE CUTTING MACHINE	<i>Shortnall</i>			
K CLEANING KERF	205	9.6	DEPTH CUT	7"	GABBED OR LOADED		
D DRILLING	180	8.5	TYPE DRILL	<i>Electric</i>			
F TAMPING-FIRING	95	4.4	NO HOLES	7-8	TYPE EXPLOSIVE <i>Percm.</i>		
T TIMBERING	140	6.6	NO. TIMBERS	5 Long, 15 Percm - 7 Long, 18 Percm			
B BRUSHING-TOP, BOTTOM	0	-	THICKNESS	<i>None</i>	GABBED OR LOADED		
P PICKING IMPURITIES	10	0.5	THICKNESS OF IMPURITIES	<i>None</i>			
L LOADING AT FACE	655	30.8	NUMBER OF CLEAN-UPS	<i>2 per shift</i>			
H CAR TRIMMING	165	7.8	TYPE HOIST	<i>Electric</i>			
S HANDLING SUPPLIES	85	4.0	TYPE CONVEYOR	Chain	CAR CAPACITY 1.5 N.T.		
E EXTENDING CONVEYORS	310	14.6	GENERAL REMARKS				
R REPAIRS	0	-	* <i>Idle time principally for</i>				
M MISCELLANEOUS	0	-	<i>Lunch taken at odd times.</i>				
I IDLE	175	83*					
	TOTAL	2125	100.0				



Book Reviews

"MAN IN A CHEMICAL WORLD" by A. Cressy Morrison, Charles Scribner's Sons, New York and London, 292 pages, \$3.00.

THE task of presenting a record of the accomplishments of one of our leading industries in the pages of one book is indeed great. In *Man in a Chemical World*, the author has given a most enthusiastic and charming interpretation of the vital service of the chemical industry in our everyday life.

Giving Nature credit for being the great chemist, the author pictures the workings of science in studying Nature's methods with a view of creating new substances or better adapting natural materials; and applying the results of this research in supplying man's developing needs that he may enjoy the more abundant life.

In an open unbiased manner that is most pleasing, the material things that enter into our existence are considered from the chemical viewpoint. The industry is pointed out as the key to the possibilities that have made our civilization and progress possible.

The preparation of this review was an outgrowth of the celebration of the three hundredth anniversary of the birth of the chemical industry in the United States. Intended to be educational, from the cultural as well as the utilitarian points of view, the volume, through its consideration of the workings of science in every phase of modern living, serves its purpose well. It is a fitting tribute to the chemical industry.

"ESSENTIALS OF ENGINEERING ASTRONOMY" by Jerry H. Service. Prentice-Hall, Inc., New York, 165 pages, \$2.50.

WRITTEN in a plain, practical manner, *Essentials of Engineering Astronomy* is intended as both a book of instruction and a reference for the student and practicing civil engineer, mining engineer and geologist. It presents the fundamentals of astronomical observations and calculations for those who must rely on only a good transit and a good watch. In addition, it contains a brief but adequate discussion of the use of striding levels and solar attachments.

Following an introductory chapter devoted to a general description of the stellar system, the author presents a review of the fundamentals of spherical trigonometry and a clear, well-illustrated discussion of the celestial sphere, time, etc. The working formulas necessary for the determinations involved in engineering astronomy are derived and ex-

plained in order to give the reader a suitable background for the practical work and computations covered in the second part of the book.

The practical phase of the work begins most naturally with a chapter entitled "Star Identification." The technique of observations and computations that will insure accuracy and speed in determining azimuth, latitude and longitude are made doubly clear by a number of filled-in sample observation forms.

Professor Service has presented this subject, ordinarily confusing if not difficult, from a most practical and understandable point of view that will be greatly appreciated by the student and practicing engineer or geologist.

"GOLD DEPOSITS OF THE WORLD" by William Harvey Emmons. McGraw-Hill Book Company, New York. 562 pages. \$6.

WHEN we scan this comprehensive work we remember Leck's *Gold: Its Occurrence and Extraction* (1,229 pages, 1882), De Launay's *The World's Gold: Its Geology, Extraction, and Political Economy* (242 pages, 1908), and Maclarens *Gold: Its Geological Occurrence and Geographical Distribution* (687 pages, 1908). The first two are long out of print and the reviewer was told that Maclarens had in hand a revision of his notable reference work when he died in 1935. Many new features in geology, mineralogy, mining, and milling have been unearthed and developed since 1908, and Emmons brings them to 1937.

Gold Deposits of the World does cover all countries and is enriched by 332 maps and geologic sketches, well drawn and lettered, and by many authoritative references from which the author has drawn freely.

The last eight pages of text cover prospecting in a general way. The examples of concentration of gold lodes in and near cupolas and small stocks and other controlling structures are referred back to the pages in which they are described and sketched. The importance of outcrops and how they may appear, the effect of glaciation on alluvials, and the relation of placers to lodes receive brief mention. Early in the book are listed 24 minerals that are stable in placers.

Outline maps of the eastern and western hemispheres delimit the gold fields and their geologic periods of deposition. The deposits are classified under eight heads. Gold deposits are rarely found in regions where there are no exposed igneous bodies, and the association of auriferous lodes with igneous rocks is

almost universal. The batholith, gases in magmas, fractures, lode systems and mineralization are concisely discussed. The 500 pages that follow the foregoing introductory matter describe at suitable length the many and various types of gold deposits throughout the world, with their occurrence, mineral association, and production. No country has been skimped, and all the important deposits are clearly sketched, thus offering suggestions for prospecting and exploration.—M. W. Von Bernewitz.

MINERALS YEARBOOK, 1937. United States Department of the Interior, Bureau of Mines. Compiled under the supervision of H. H. Hughes, Economics and Statistics Branch. U. S. Government Printing Office, Washington. 1,502 pages. For sale by Superintendent of Documents, Washington, D. C., \$2.25.

THE past few years have witnessed constant improvement in this, the official record of the mining industry in the United States; and the 1937 volume, comprising a review of 1936 mineral production data, carries on the good work. Making its appearance in mid-August and containing a major amount of final figures for 1936, the staff of Bureau of Mines experts who have collaborated in presenting these facts have turned out a fine piece of work in record time. Preliminary figures, when present, are plainly indicated as such; in these cases, final figures will be released later in mimeographed reports and, of course, included in next year's volume.

The volume is composed of four main parts: I, Survey of the mineral industries; II, Metals; III, Nonmetals; and IV, Mine Safety. Detailed reviews of mineral commodities are presented in 72 chapters under these main heads.

The general review chapters at the beginning present interesting "bird's-eye" views of the economics and progress in mine mechanization of the entire domestic mineral industry, a review of world production of minerals and economic aspects of international mineral policies, and also detailed state figures for 1934 and 1935, available since 1932 only in the Statistical Appendix to the *Yearbook*, now discontinued.

Salient statistical features indicate total approximate value of mineral products in the United States in 1936 amounted to \$4,582,000,000, compared with \$3,650,000,000 in 1935 and \$5,887,600,000 in 1929. Value of metallic products in 1936 increased 47 percent over 1935, while nonmetallic products increased by only 20 percent, the total having shown a 26 percent rise. A 10-year review of Bureau of Internal Revenue figures showing income of mining corporations, presented in the opening chapter, discloses interesting comparisons with other industries and indicates relatively low averages for the mining companies.

News and Views

of Interest to Mining Men

Copper Companies Turn Out Record Output

Production of copper by Utah Copper Company during August was highest in the company's history, and an all-time record for daily production has also been reached. Output was still holding at capacity in mid-September. Work on the Bingham vehicular tunnel, being driven to permit enlargement and deepening of the huge Bingham pit, is moving ahead rapidly, some 2,000 feet of advance having been made toward completion of the one-mile project. Utah Construction Company is doing the work.

Phelps Dodge reports that an all-time record monthly production was made by their New Cornelia branch at Ajo in August, with an output of 10,700,000 pounds of copper. Capacity of the company's smelter at Douglas has been taxed to the limit, and the overflow has been sent to the Clifton smelter, which is being overhauled preparatory to regular operation. The capacity of the Ajo mill has been enlarged to 20,000 tons daily.

Enlarged mining operations of the Miami Copper Company and Inspiration Consolidated Copper Company have resulted in a 100 percent increase in population of the town of Miami since the depression. Both companies are operating at capacity day and night. Other Arizona copper towns are also very active.

In Nevada capacity output of 6,000 tons of ore per day is being made by Consolidated Coppermines Corporation, according to a recent statement by officials. This is the maximum amount provided for in the new contract made with Kennecott Copper Corporation, which treats Consolidated ore in its plants.

Coal Men Congregate at Ebensburg

A most interesting exhibit of mining machinery and supplies was one of the features of the Cambria County Fair held at Ebensburg, Pa., during the week of September 6.

Hundreds of coal men visited the exhibits during the run of the fair, but the high-light of the week was the exhibitors' party at the Sunnepanna Country Club, sponsored by the manufacturers of mining equipment, to which the representatives of various coal companies were invited.

Throughout the day, 175 men competed in the "Kickers' Handicap" golf match, and at noon a buffet lunch was served. A perfect day was completed by an informal dinner attended by 350 guests,

which included more than 200 coal operators from Ohio, Maryland, West Virginia, and Pennsylvania.

Charles F. Hosford, chairman of the National Bituminous Coal Commission, was the principal speaker at the dinner. With pleasing frankness, Mr. Hosford discussed the troubles of the coal industry. Referring to the Guffey Coal Law, he declared: "You may or may not like it, but it's a law of the United States and it affects your industry. Therefore you will obey it."

He said that the coal industry had been internally sick for years and that it had crippled itself more than any other industry in the country. Looking to the future, he prophesied that the National Bituminous Coal Commission is almost certain to improve conditions.

Following the dinner, more than 75 prizes were presented to those participating in the golf match, and 100 door prizes were distributed to the guests.

The American Mining Congress was among the organizations who sponsored the Exhibitors' Party.

Silver Belt Lawsuits Settled

Nine lawsuits involving various and conflicting claims in the silver belt of the Coeur d'Alenes have been settled out of court and their property incorporated into the holding of a new company known as Big Creek Apex Mining Company. The new corporation will be con-

trolled by Sunshine Consolidated, Inc., of which Frank Eichelberger is president and manager. The new company is capitalized for \$100,000 divided into 2,000,000 shares, par value 5 cents each. One-fourth of the stock goes to Henry B. Kingsbury, of Wallace, Idaho, for the interests he and associates have held. The rest of the stock goes to Sunshine Consolidated Company, which will finance the new project and direct exploration and development. The first work will be diamond drilling north and south from the west drift of Sunshine Mining Company's 1,700-ft. shaft. Among the companies which were involved in the diversified litigation which has thus been brought to a settlement are Coeur d'Alene Big Creek Mining, Sunshine Mining, Sunshine Extension Mining, and Sunshine Consolidated.

First Annual Pennsylvania Safety Day and First Aid Contest

Top honors in Pennsylvania's first Annual Safety Day and First Aid Contest held at the Cambria County fairgrounds at Ebensburg, Saturday, September 11, went to the team of the Ellsworth No. 51 mine of the Industrial Collieries Corporation with a near-perfect score of 99.85.

Eighty-nine teams from all parts of the state participated in the first aid contest. Second and third places went to the Indianola mine of the Republic Steel Corporation, and the Filbert mine of the H. C. Frick Coke Company, respectively.

Twenty-four teams were awarded prizes. Members of the winning team were awarded \$50 each in cash, small individual silver loving cups donated by National Coal Association, bronze medals presented by the American Red Cross and the entire team received a large gold loving cup donated by the Cambria County Fair Association. P. F. Laird,



First Aid teams competing at Pennsylvania Safety Day.

deputy secretary of mines and director of the meet, announced the winning teams and awarded the prizes.

Principal speaker at the event was David L. Lawrence, Secretary of State, Commonwealth of Pennsylvania. He commended the miners for their interest in first aid work and the progress that has been made during the past few years in reducing mine accidents.

Others who spoke briefly were Charles M. Schwab, chairman of the Board of Directors of the Bethlehem Steel Corporation; Michael J. Hartneady, State Secretary of Mines; Charles O'Neill, of Altoona, president of the Central Pennsylvania Coal Producers' Association; and James Mark, of Clearfield, president of District No. 2 of the United Mine Workers of America.

The event was sponsored by the Bituminous Division of the Pennsylvania Department of Mines and the Ebensburg, Indian and Barnesboro Councils of the Holmes Safety Association in cooperation with the United Mine Workers of America, Pennsylvania Coal Mine Operators and the United States Bureau of Mines. Originally scheduled to have been held in the infield of the race track at the fairgrounds, the contest was staged in the fairgrounds arena because of wet weather.

Despite the crowded condition of the arena and all the adverse circumstances, the meet was a complete success. J. J. Forbes, supervising engineer of the Safety Division, United States Bureau of Mines, served as chief judge and was assisted by a corps of team judges from West Virginia and Pennsylvania.

Annual Meeting of Illinois Mining Institute

The forty-fifth annual meeting of the Illinois Mining Institute will be held on November 5 at the Hotel Abraham Lincoln, Springfield, Ill., it was recently announced by B. E. Schonthal, secretary of the Institute.

Anthracite Shipments

Shipments of anthracite for the month of August, 1937, as reported to the Anthracite Institute, amounted to 2,436,930 net tons. This is an increase, as compared with shipments during the preceding month of July, of 15,426 net tons, or 0.64 percent, and when compared with August, 1936, shows a decrease of 480,447 net tons, or 16.47 percent.

Elton Tunnel Progressing

The Elton Tunnel has been driven more than 2,700 ft. toward its total length of 23,000 ft. from Tooele to Bingham. This project is under the management of National Tunnel and Mines Company, and during its advance an average of over 39 ft. per day has been attained. Outside dimensions are 12 x



Welded Steel Hopper Barges

Ten of these welded steel hopper barges were constructed for the Pittsburgh Coal Company by the Treadwell Construction Company, Midland, Pa. The barges are 175 ft. long, 26 ft. wide and 11 ft. deep. Weighing 150 tons, each barge has a capacity of 1,000 tons. Westinghouse welders were used for the 12,000 lineal ft. of welding in each.

12 ft. Purpose of the tunnel is to drain connecting mines (Utah Apex and Utah Delaware) and to transport ore. It will also relieve somewhat the congested population in the vicinity of Bingham, allowing employees to live in the broad valley country near Tooele.

Continued Increase in Phosphate Rock Shipments

Midyear reports forecast a 20 percent increase in shipments of phosphate rock during the current year as compared with 1936 when they aggregated 3,351,857 long tons valued at \$11,406,132. For the first six months of 1937 the quantity of phosphate rock sold or used in the United States, as compiled from reports to the Bureau of Mines, was 1,930,582 tons valued at \$5,922,332. Comparable figures for the corresponding period of last year are not available but production of superphosphate, by far the leading use for phosphate rock, advanced 48.1 percent and raw rock shipments for the first half year are 15 percent more than one-half those for the calendar year 1936. It is gratifying to note, too, that shipments during July and August continued at a very high rate and business booked by several companies for September runs well ahead of last year.

U. S. Bureau of Mines to Dedicate New Experiment Station

Dedication of the new Bureau of Mines Eastern Experiment Station at College Park, Md., will take place on Friday, October 15. In conjunction with the dedication, the Industrial Minerals Division of the A. I. M. E. will hold meet-

ings at the Wardman Park Hotel, in Washington, on October 14, together with a joint meeting with the Washington section of the A. I. M. E. at the new experiment station on the morning of October 15.

Prominent guests will be introduced to the gathering at a luncheon to be held in the University of Maryland dining hall on the day of the dedication. The dedicatory exercises at 3 p. m. will be presided over by Julian D. Conover, secretary of the American Mining Congress. Addresses will be made by Dr. John W. Finch, director, U. S. Bureau of Mines; Dr. H. C. Byrd, president, University of Maryland; and by the Honorable Harry W. Nice, Governor, State of Maryland. A message from the Honorable Harold L. Ickes, Secretary of the Interior, will be read to the gathering.

Decline in Bootleg Mining Predicted

In a report entitled "Bootlegging or Illegal Mining of Anthracite Coal in Pennsylvania—a Census and Survey of the Facts" the State Anthracite Coal Commission of Pennsylvania predicted that increased activity in legally operated mines would be a major factor in causing a decline in bootleg operations by offering steady employment at standard wages to the 4,000 men who alone have the technical skill to operate outlaw mines.

"The gradual exhaustion of coal deposits that are easily accessible from the surface, the increasing severity in Pennsylvania and in other states of legal restrictions on the trucking and sale of bootleg coal and the slowly improving

prospects for a genuine revival of the whole legitimate anthracite industry seem to forecast a gradual natural decline of bootlegging in future years," according to the report.

Earlier estimates of the amount of coal produced by the bootleg industry were sharply reduced by the Commission, which estimated that in 1936-37 production amounted to only 2,400,000 tons of anthracite, or about 5 percent of the amount legally mined in the same period. Bootleg output in the peak year of 1935 scarcely reached 2,900,000 tons, according to the report. These estimates compare with amounts varying from 4,000,000 to 5,000,000 tons, as compiled by different private organizations.

Consumers paid about \$16,000,000 for bootleg coal last year, and in the same period the outlaw industry provided the sole means of subsistence for about 45,000 persons in Pennsylvania. The report goes on to show that the number of men actually engaged in some phase of bootlegging is now about 13,000; of these, 8,300 work in coal holes and breakers, 2,000 in picking over culm and refuse banks, and about 2,700 in trucking. Some 65 percent of the bootleg operations are on the property of the Philadelphia and Reading Coal and Iron Company.

Commenting on the ethics of the practice, the report states "no one will defend stealing or trespass as such, yet the bootlegger has as much right as anyone to a chance to earn his living honestly, and he has been deprived of that right by forces not within his own control. Traditional legal rights is with the coal companies; but on the plane of common-sense ethics rather than of strict law, there is something to be said for the bootlegger."

This report is the first of 13 sections which will comprise the complete report of the Commission. The titles of these 13 chapters have been announced by the Commission as follows:

1. Census of Anthracite Bootleg Industry.
2. Monopoly and Competition in Production and Marketing, 1895-1937.
3. Excess Anthracite Coal Lands.
4. Royalties.
5. History of Freight Rates and Their Significance.
6. Financial Interrelations and Control of Anthracite Industry.
7. Present Financial Status of Anthracite Industry.
8. Anthracite Marketing Situation.
9. Constructive Possibilities Relative to Depressed or Abandoned Areas.
10. Labor Union Organizations—History and Standards—1902-1937.
11. Present Organizations of Operators and Their Objectives.
12. Study of Possibilities of Increased Use of Anthracite Coal by Anthracite Railroads and the Effect

Upon Production and Employment.

13. Constructive Recommendations for Permanent Rehabilitation of the Anthracite Industry.

Young Inspects Properties in Metaline District

Howard I. Young, of St. Louis, president of American Zinc, Lead and Smelting Co., spent the second week of September inspecting the rapidly expanding interests of that corporation in the Metaline district of Washington. He found his company has secured power line connections for both the Metaline Mining & Leasing and the Grandview projects which American Zinc now controls. He said he expected the mill on the Grandview property to be in operation in October. The plant will handle the ores which are coming out of the Metaline Mining & Leasing ground. Initial operations of the Grandview mill will probably be 100 tons a day, and rapidly brought up to not less than 300 tons a day, its full capacity.

Power for these and other enterprises

+ + +

DATES SET FOR CINCINNATI CONVENTION

Definite arrangements have just been made for the 15th Annual Coal Mining Convention and Exposition of the American Mining Congress. The dates are May 2 to 6, inclusive, and the place Music Hall, Cincinnati, Ohio.

+ + +

in the Metaline district will come from the new hydroelectric plant at Metaline Falls, completed in September by Pend Oreille Mines and Metals Co. The American Zinc Company is leasing from this plant what power it needs. Pend Oreille Mines and Metals Company, because of lack of power, for many months has had difficulty treating 300 tons of ore a day. While waiting for the new power supply, it has greatly enlarged the capacity of its mill and within less than a week after the new power connections were made it had stepped up operation to 600 tons a day.

New River Company Wins Safety Meet

The first-aid teams, white and negro, of the Skelton mine of the New River Company took the honors in the eighth annual safety meet of the New River and Winding Gulf Mining Institute held at Oak Hill, W. Va., on September 18.

Teams from the Price Hill Colliery Company took second place in each section, while third place in the white group was won by the Stanaford team of the

Koppers Coal Company, and third place in the negro group went to the Summerlee team of the New River Company.

A crowd of 8,000 persons turned out to watch the contest between the 49 teams entered. The response to the welcoming address of Mayor C. R. Hill was given by Fred Dixon, vice president and general manager of the Price Hill Colliery Company. The principal speaker of the event was Clarence W. Meadows, Attorney General of West Virginia, who gave a brief but sincere talk on mine safety. Others who spoke briefly were E. D. Hodson, Beckley, representative of the United Mine Workers of America; S. C. Higgins, secretary, New River Coal Operators Association; L. A. Toney, Mount Hope, assistant secretary, Fayette County schools, and president of the New River and Winding Gulf Colored Mining Institute. A varied program of music and other entertainment was given between the contest events.

N. P. Rhinehart, chief of the West Virginia Department of Mines, awarded the prizes to members of the winning teams. Robert Lilly, president of the Institute, was director of the meet; and Adam Crawford, safety director, Mallory Coal Company, served as chief judge.

General Electric Begins Tungsten Production

Operations have been started by the General Electric Company at their Germania Mine, situated a short distance west of Springdale, Wash., with daily production amounting to about 100 pounds of tungsten concentrates. The 50-ton mill has been idle since the property was taken over by the company about a year ago. The present tight situation in the world tungsten industry, brought about by the Chinese-Japanese undeclared war, practically closing China as a major source of the metal, and hiking prices to new post-war peaks, testifies to the farsightedness of the company in thus developing its own domestic source of supply. The Germania mine ore is said to yield unusually pure tungsten, particularly well adapted for the company's needs in manufacturing incandescent lamp filaments. H. H. Barrows, of Oakland, is manager of the tungsten mine division of the company.

New Plant for Kelley's Creek Colliery

Announcement was recently made by Kelley's Creek Colliery Company that work will begin October 1 on construction of a new tipple and washing plant at its Maiden mine, Maudsville, W. Va. The new plant will have a daily capacity of 4,000 tons, and will be equipped with a McNally-Norton automatic washer.

Illinois Mineral Industries Conference

The fifth annual Mineral Industries Conference was held October 8-9 at Urbana, Ill. Special sessions on coal were held on Friday afternoon and Saturday morning. Papers presented at these sessions were as follows:

Friday afternoon: "Fuel Oil as a Competitive Factor in the Domestic Fuel Market" (speaker pending); "Changes in the Constitution of Illinois Coals Through Preparation Processes, and the Importance of These Changes on Utilization," by L. C. McCabe; "The Aims of the Bituminous Coal Act of 1937," by a representative of the Bituminous Coal Commission, Washington, D. C.

Saturday morning: "Smoke Prevention Measures and Illinois Coal," by Osborn Monnett; "Reclamation of Refuse at Illinois Coal Mines," by C. M. Smith and D. R. Mitchell; "Trends in Coal Selection for Small Stokers," by K. C. Richmond.

Mining Safety Important Topic at 26th National Safety Congress and Exposition

Seven thousand men and women from all sections of the United States and several foreign countries, representing every field of human endeavor from agriculture to woodworking, from meat packing to mining, and from aviation to railroading, will gather in Kansas City during the week of October 11 to 15 to attend the Twenty-sixth National Safety Congress and Exposition.

Sessions of the Mining Section will be held October 12-14, under the chairmanship of C. W. Gibbs, general manager, Harwick Coal and Coke Company.

The program for the opening session includes a paper on "The Relationship of Safety to Efficiency in Mining," by James K. Richardson, safety director, Climax Molybdenum Company, and another on "Safety Program for the Reduction of Accidents in Coal Mining," by Thomas Allen, chief coal mine inspector, State of Colorado. The second session will be devoted to a panel discussion on "Specific Accidents and Hazards and Their Elimination," covering all types of mining, with discussions by John Lyons, safety engineer, Bell & Zoller Coal and Mining Company; John D. Cooner, safety inspector, Hudson Coal Company; G. J. Barrett, secretary, general safety committee, Oliver Iron Mining Company; Richard S. Newlin, mining engineer, Inspiration Consolidated Copper Company; H. W. Giessing, safety engineer, Commerce Mining and Royalty Company; J. J. Forbes, supervising engineer, safety division, United States Bureau of Mines.

The closing session will open with a forum discussion on "Ventilation and Dust Control," led by W. H. Comins, local manager, National Pigments and Chemical Division, National Lead Company, followed by a paper on "New



Bulldozing Wash Ore at Hill Annex Mine, Minnesota

Operations of Inter State Iron Co. at Hill Annex Mine, Minnesota. "Caterpillar" Diesel RD7 equipped with LaPlant-Choate roadbuilder, bulldozing wash ore from top of bench 250 ft. long leaving waste ore and rock to be loaded by shovel for the dump.

Safety Kinks in Mining," by W. D. Haselton, iron mines safety supervisor, Pickands, Mather and Company; and another on "Handling Safety in a Large Mexican Mine," by A. C. Fernandez, safety engineer, Fresnillo Company, Fresnillo, Zacatecas, Mexico.

U. S. Vanadium Increases Capacity

Installation of additional mining and ore treatment equipment is being made at the new operations of United States Vanadium Corporation at Uravan, Colo. (Paradox Valley region). The new installations will almost double the original plant capacity, enabling the company to mine and process about 7,500 tons of ore monthly. A development campaign underground is also under way. J. R. Van Fleet is vice president, Blair Burwell is general superintendent, and William G. Haldane, assistant general superintendent.

Bootleg Operations Claim 100 Deaths in Two Years

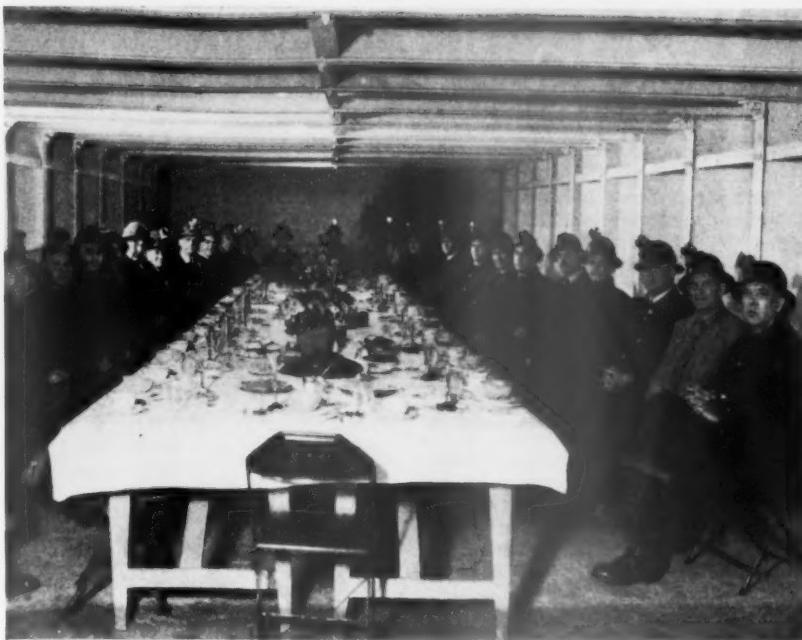
In a preliminary report, the first to show the number of deaths incurred in bootleg coal mining, it was recently revealed that more than 100 unauthorized miners have met death in the past two years in the improvised coal holes covering the hills of the anthracite district.

Cave-ins and rock falls accounted for most of the casualties. Large numbers have also been rescued, many of them by safety teams of the mining companies on whose property the illegal operations were being conducted.

The Department of Mines ordered the study as a part of the state's campaign to stop this illegal mining. A special session of the legislature to be held early in 1938, is contemplated to consider legislation against this practice.

Knob Hill Plant in Operation

Knob Hill Mines Company has one of the three largest producing mines in the state of Washington. The other two are Azurite Gold Company, financed by A. S. & R., and Pend Oreille Mines & Metals Company. The Knob Hill is at Republic, Wash., and is a rejuvenation of one of D. C. Jackling's enterprises of a great many years ago. The California interests which are behind this project have put in a 400-ton cyanide plant to treat the low grade gold ore in this property. The company's expenditures are reputed to be \$400,000. The plant already is in operation, almost up to capacity. Frank Mettler, superintendent, says the mill is the most modern and perfect in the United States. Officers of the company are A. O. Stewart, president, and Walter Lyman Brown, vice president and manager.



U. S. Steel Safety Committee Meets Underground

Holding one of its periodic meetings recently in Duluth to review safety progress and to discuss new methods of safety practice, the Safety Committee of the United States Steel Corporation donned overalls, boots and steel helmets, descended 236 ft. below the surface of Oliver's Spruce Mine at Eveleth, Minnesota, to be guests at a novel luncheon in an underground theatre used primarily for safety meetings. Cut out of solid rock, this room is approximately 17 x 51 x 8 ft. and was originally used to house pumping equipment. Steam heated and

electrically lighted, it has a seating capacity of 220 for showing safety films on company time to employees just before they go to work. First used for this purpose in 1925, the underground theatre now has a kitchen and orchestra platform which makes it more suitable for banquets and safety meetings. During the week of meetings and inspection tours, the Safety Committee was gratified to learn that accident frequency, severity, and economic loss continues on a downward trend for the corporation as a whole.

Howe Sound Develops Washington Property

Howe Sound Mining Company has started construction on its \$2,000,000 development program at the Chelan copper mine which it has taken over on Railroad Creek above Lake Chelan, in the Cascade Mountains in the state of Washington. Washington Water Power Co., of Spokane, will build a transmission line of 110,000 volts from its Chelan plant to the mine, a distance of 55 miles. Permission to build the power line was granted after being resisted by the forest service on the ground that it would mar the scenic attractions of the district. Barges are being built on Lake Chelan for the transportation of equipment. Water and air are the only means of reaching the mine's location. About

400 men will be employed this fall. The power line will be completed about the first of the year.

Resume of Coal Commission Activities

Since its inception in May, the National Bituminous Coal Commission has been pursuing a course of feverish activity directed towards the setting of minimum prices and marketing rules and regulations for the bituminous coal industry.

The first duty of the Commission as set forth in the Guffey-Vinson Act is to establish a scale of prices for bituminous coal which will raise the total return for the industry and for each of the 23 producing districts into which the country is divided, to a level above the weighted average cost of production.

In order that this weighted average cost of production might be arrived at, the act also established 23 statistical bureaus as part of the Commission's make-up. Producers must file with these bureaus an account of every transaction in coal. These reports of individual transactions are kept in confidence by the Commission in the same manner in which income tax figures below the \$15,000 figure are held secret; the Commission tabulates and assembles them. The results give for the first time an official picture of the cost of producing coal in any part of the United States, the channels through which it is marketed, the consumers whom it reaches and the profits in each step of the transaction. To complete the picture, the statistical department in Washington, early in its existence, assembled complete data as to costs and realizations for the year 1936 and the first six months of 1937. Since the first of January of this year, it has been making its own assembly from the individual reports submitted by producers, which reports are subject to investigation by the representatives of the Commission's home or field offices.

In possession of the statistical division at present there are about 15,000,000 pieces of paper, including the individual reports and the tabulations upon which they have been assembled, to show how each factor in the cost of coal bears upon the final result. Practically all of this material has been assembled in Washington for ready reference during the series of hearings held on the classification of

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coal and for hearings held on prices submitted by the various district boards.

The Guffey-Vinson Act is specific on this method of coordination. It provides that in proposing their prices:

"Each district board shall, from time to time on its own motion or when directed by the Commission, propose minimum prices free on board transportation facilities at the mines for kinds, qualities, and sizes of coal produced in said district, and classification of coal and price variations as to mines, consuming market areas, values as to uses and seasonal demand. Said prices shall be proposed so as to yield a return per net ton for each district in a minimum price area, as such districts are identified and such area is defined in the subjoined table designated "minimum-price area table," equal as nearly as may be to the weighted average of the total costs, per net ton, determined as hereinafter provided, of the tonnage of such minimum price area. The computation of the total costs shall include the cost of labor, supplies, power, taxes, insurance, workmen's compensation, royalties, depreciation and depletion (as determined by the Bureau of Internal Revenue in the computation of the Federal income tax) and all other direct expenses of production, coal operators' association dues, district board assessments for board operating expenses only levied under the code, and reasonable costs of selling and the cost of administration."

Having proposed these prices, the district boards assembled in Washington, coordinated them and submitted them to the Commission for public examination and hearing according to the following formula:

"(b) District boards shall, under rules and regulations established by the Commission, coordinate in common consuming market areas upon a fair competitive basis the minimum prices and the rules and regulations proposed by them, respectively, under subsection (a) hereof. Such coordination, among other factors, but without limitation, shall take into account the various kinds, qualities, and sizes of coal, and transportation charges upon coal. All minimum prices proposed for any kind, quality, or size of coal for shipment into any common consuming market area shall be just and equitable, and not unduly prejudicial or preferential, as between and among districts, shall reflect, as nearly as possible, the relative market values, at points of delivery in each common consuming market area, of the various kinds, qualities, and sizes of coal produced in the various districts, taking into account values as to uses, seasonal demand, transportation methods and charges and their effect upon a reasonable opportunity to compete on a fair basis, and the competitive relationships between coal and other forms of fuel and energy; and shall preserve as nearly as may be existing fair com-

petitive opportunities. The minimum prices proposed as a result of which coordination shall not, as to any district, reduce or increase the return per net ton upon all the coal produced therein below or above, the minimum return as provided in subsection (a) of this section by an amount greater than necessary to accomplish such coordination, to the end that the return per net ton upon the entire tonnage of the minimum price area shall approximate the weighted average of the total cost per net ton of the tonnage of such minimum price area. Such coordinated prices and rules and regulations, together with the data upon which they are predicated, shall be submitted to the Commission. The Commission shall thereupon establish, and from time to time, upon complaint or upon its own motion review and revise the effective minimum prices and rules and regulations in accordance with the standards set forth in subsections (a) and (b) of part II of this section."

Subsidiary to this work the Commission under the law has had to hear suggestions for marketing rules and regulations, the scale of discounts permitted to distributors, with the definitions of distributors, the application of producers who claim exemption from the code because of mining and selling coal intrastate with no direct effect on interstate commerce in coal, and the application for exemption of so-called "captive" mines, defined in the act as mining "coal consumed by the producer" or "coal transported by the producer to himself for consumption by him."

More than 100 hearings have already been held, either by the Commission as a whole, by panels of its members, or by trial examiners, men with judicial experience appointed to take testimony and report findings of facts and recommendations for action by the Commission. A score more of hearings are scheduled; and, once the minimum prices are established and subsidiary findings made on rules and regulation, classifications, discounts and exemptions, it is expected that many more hearings will be necessary for possible readjustment to meet individual inequities that may be complained of.

From evidence so far submitted at these hearings it appears that the Commission will find few mines that do not directly affect interstate commerce in coal, as evidence has been submitted to show that even the smallest mines in one state come into direct competition in markets, no matter how near at hand to the local mines, with coal shipped from other states into the same market. Serious question has also been raised as to whether any so-called "captive" mines may be exempted.

It is hence presumed that practically all production will come under the code and the regulation of the Commission. Already 98 percent of the country's tonnage has accepted the code, according to the Commission; and though the percentage of individual producers is lower,

it is anticipated that this, too, will increase as the work of the Commission progresses.

Pending the establishment of minimum prices, followed by classification, distributing and discount rules, the Commission has only reached three final decisions—granting provisional approval as marketing agencies to Alabama Coals, Inc., Appalachian Coals, Inc., and the Smokeless Coal Corp. These were found by the Commission to be service and promotional rather than sales organizations.

The seven members of the Commission more or less roughly divide the work of the Commission and the supervision of its various divisions among themselves. In addition to a secretary's office with the usual staff and duties required for the functioning of such a quasi-judicial body, there are the usual financial, personnel and service divisions. Peculiar to the Coal Commission, however, are the statistical division with its bureaus, the marketing division, the traffic division, the code membership and code enforcement divisions and the legal investigating divisions.

There will be about 30,000 individual prices scheduled when the Commission concludes its hearings. There will be not only a base price for each size and kind of coal from each mine, but a coordinated price at which that coal will be sold for each market to which it is or may be shipped.

To handle this work the Commission now has a total of about 700 employees in the field and in Washington. It is not expected that the staff will be greatly enlarged, as the work of enforcement, the Commission indicates, will not be any greater than the work of inaugurating the whole system and getting it functioning within a single season.

The basic price schedule, it is expected, will be in effect by the middle of October, in time to meet the peak of the autumn and winter buying. Already enough material has been assembled to show that the principal increases in price will be borne by the railroads, utilities and large industries. Domestic consumers of household coal, who account for only 20 percent of the tonnage, will, it is pointed out by the Commission, bear little part in this increase. While the prices for large users will show an increase over the distress prices they have been recently paying, they will not be above, and may be below, the prices paid under the last effort to regulate bituminous coal under the NRA.

One of the most important actions of the Commission during the month of September was the issuance of an order, which, according to the Commission, "was designed to aid in the stabilization of the bituminous coal market pending the establishment of prices." This order prohibited code members from entering into contracts or from accepting orders for delivery of coal for longer than 30 days. The decision to limit contracts, the Commission explained, was made to give full force to minimum prices when established. Code members were also prohibited from granting a discount or price

allowance on the undelivered portion of any contract in existence between distributors and buyers of coal, after the date when minimum prices are fixed, unless the contract price was not less than the code price in effect at the time of delivery. Contracts entered into prior to June 16, 1933, as outlined in the Guffey-Vinson Act, are not affected by the order, provided the Coal Commission authenticates the contracts with regulations which are in the formative process.

Hearings have been held in North Dakota on the question of whether or not lignite coal should be excluded from the operations of the Bituminous Coal Act of 1937. Testimony at these hearings revealed that no coal other than that conforming to the specifications of lignite (less than 30 percent moisture or more than 7,600 B.t.u.) was to be found in North Dakota. The application for exclusion of lignite is being held under advisement by the Commission.

With the promulgation of the minimum price schedules and the demands for hearings and the numerous hearings already on the calendar, indications are that the Commission will have to maintain its fast pace in its efforts to reach the objectives of the Guffey-Vinson Act.

Jack Waite Developments

Jack Waite Mining Company made a net profit in the first six months this year of \$28,650.01. The property is on the divide between Idaho and Montana, 12 miles north of Murray, Idaho. In the six months the company produced 25,985 tons, milled 22,123 tons, shipped 876 tons of crude lead ore, 23,077 tons of lead concentrates and 846 tons zinc concentrates. The company is doing important development work by an easterly and westerly extension from the new Montana shaft on the 1,800-level. This level is 1,450 feet below the highest surface outcrops. The American Smelting and

Refining Company controls this property and is doing the work.

New Plant for Galloway Coal

Galloway Coal Company, which is developing one of the most modern mines in Alabama at Carbon Hill, is planning to build a new power house in addition to a modern tipple and compressor. Total investment will exceed \$250,000.

P. and R. Culm Banks Leased

The S. W. Blakslee Company have leased culm banks of the Otto Colliery, at Pottsville, Pa., from the Philadelphia and Reading Coal and Iron Company. The company plans to raze an old breaker and replace it with a modern washery to recover the marketable coal in the banks, which are estimated to contain 1,000,000 tons.

Members of the company include S. W. Blakslee, formerly production manager of the Philadelphia and Reading Coal and Iron Company, as president; John E. Jones, of West Pittston, vice president; and William L. Jones, of West Pittston, secretary-treasurer.

Metals Talk

In a recent address before the American Alumni Council, David McCord, secretary of the Alumni Fund at Harvard, ended his talk by giving refreshing quotations from letters received in the conduct of his duties. The following won the prize:

"Gentlemen:

"As I am an aluminum of two other colleges besides Harvard, and cannot, with my bismuth in its present state, pay antimony to all three, I hope you will not think me a cadmium if I do not caesium this opportunity of making a donation. So far this year I have metal current expenses, but in

these troubled times when the future holds in store we know not phosphorous, I could not make a contribution without boron from the bank. It would nickel out of my savings. A manganese spend his dollars these days; a tin spot is gone in no time. One is lead to feel he is putting them down the zinc. Much better to sodium up in a stocking. So don't be silicon not make any contribution this year unless a bromine helps me out.

"Very unruly yours,"

Mr. McCord, pointing out the care exercised to answer all letters received, indicated that his correspondent had omitted one good metal so wrote him simply "Iron stand you."

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.
OF THE MINING CONGRESS JOURNAL, published monthly at Washington, D. C., for October 1, 1936.

City of Washington,
District of Columbia, ss:

Before me, a notary public in and for the state and county aforesaid, personally appeared B. E. Chambers, who, having been duly sworn according to law, deposes and says that she is the business manager of THE MINING CONGRESS JOURNAL, and that the following is, to the best of her knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 411, Postal Laws and Regulations, printed on the reverse side of this form, to wit:

1. That the names and addresses of the publisher, editor, and business manager are:

Name of publisher, The American Mining Congress, Washington, D. C.

Editor, Richard J. Lund, Washington, D. C.

Business manager, B. E. Chambers, Washington, D. C.

2. That the owners are: The American Mining Congress—a corporation, not for profit. No stockholders. President, Howard L. Young, St. Louis, Mo. Secretary, Julian D. Conover, Washington, D. C.

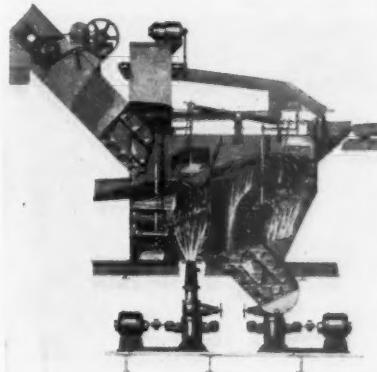
3. That the known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages, or other securities are: None.

B. E. CHAMBERS,
Business Manager.

Sworn to and subscribed before me this 27th day of September, 1937.

[S/N] ELSIE L. LEISHEAR,
Notary Public.

(My commission expires January 31, 1939.)



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—Personals—

E. T. Stannard, president of the Kennecott Copper Corporation, has been visiting mines and ore plants of the Utah Copper Company and the Nevada Consolidated Copper Corporation in Utah and Nevada.

G. R. Waddell, of Wellsburg, W. Va., has been appointed truck mine inspector for the West Virginia Department of Mines.

Harry C. Livingston, draftsman and general assistant in the engineering department of the Union Pacific Coal Company for the past 10 years, was recently appointed assistant chief engineer, in place of the late James L. Libby.

George C. Heikes, of the St. Louis Smelting and Refining Company, has been in the Western States on business; while there he attended the Metal Mining Convention of the American Mining Congress, at Salt Lake City.

R. E. Howe was recently elected president of the Appalachian Coals, Inc. He succeeds the resigned management committee, consisting of John A. Howe, chairman; W. J. Cunningham and L. E. Woods, the members of which continue as directors of the corporation.

W. G. Caperton, president and general manager of the Slab Fork Coal Company, Charleston, W. Va., was recently elected president of Smokeless Coal Corporation, marketing agency of West Virginia low-volatile coals.

J. O. Elton, manager of the International Smelting and Refining Company, has been on an inspection trip to the Mountain City copper mine.

Ben Rose, formerly foreman of the United mine of the Truax-Traer Coal Company, at Wevaco, W. Va., has been appointed superintendent of the company's new operation at Marfork, W. Va.

George M. Humphrey, president of the M. A. Hanna Company, recently returned from a trip abroad, accompanied by his family.

Arthur C. Green has been appointed sales manager of the Goodman Manufacturing Company. He has been with the company in the sales end of the business since 1911 and in recent years as manager of western sales.

Mr. Green is a graduate of the University of Michigan, a member of the A.I.M.E. and American Mining Congress, a life member of the Illinois Mining Institute and a director of the Goodman Manufacturing Company.

Delbert H. Pape, associated since 1929 with the retail interests of the Pittston Company in the East, has been elected president of the Sheridan Coal Company and of the Hotchkiss Coal Company, the Pittston company's coal-producing interests in Wyoming.

H. L. Griffin, formerly division engineer of the Koppers Coal Company at Grant Town, W. Va., has been made superintendent of the Lafferty No. 6 mine of the Hanna Coal Company, at Lafferty, Ohio.

Dr. John A. Fulton, director of the Mackay School of Mines, Reno, Nev., is on a year's leave of absence to attend to personal mining interests. During his absence Prof. John A. Carpenter, who has been professor of mining at Reno since 1926, will be acting director.

Fred A. Kraft, director of employees' service of the Consolidation Coal Company for the past 11 years, has resigned to accept a position in Philadelphia, Pa.



Stanly A. Easton

Stanly A. Easton, president and general manager of Bunker Hill and Sullivan Mining and Concentrating Company, recently announced that **H. I. Altshuler**, formerly of Pachuca, Hidalgo, Mexico, has succeeded him as resident manager. In future, Mr. Easton will devote his time to executive work and development of other properties owned by the company, retaining his position as president.

Ray J. Barber, consulting engineer of San Francisco, has gone to Fairbanks, where he will assume duties as dean of the School of Mines of the University of Alaska.

F. H. Brownell, chairman of the board of the American Smelting and Refining Company, recently returned from a trip abroad, reporting a favorable situation in the lead and zinc industry.

J. A. Welch has been appointed chief mine inspector of the Division of Mines of Tennessee, succeeding **A. W. Evans**.

O. E. Young, formerly mill foreman at the United Verde Branch of the Phelps Dodge Corporation, is now on the metallurgical staff of the Climax Molybdenum Company at Climax, Colo.

William C. Carter and **Edward J. Burnell** were recently elected vice presidents of the Link Belt Company. Both men are mechanical engineers, Mr. Carter having risen through various positions in the production department to his recent post in charge of company production, while Mr. Burnell has occupied responsible positions in sales and production activities for the company.

—Obituaries—

A. B. Aldridge, prominent civic leader and industrialist of Birmingham, died on August 30. He was formerly president of the Alabama Mining Institute, and during the life of the Industrial Recovery Act he was administrator of the coal section in Alabama, Georgia, and Tennessee. Long identified with the coal industry, at the time of his death he was president and a director of the Southeastern Fuel Company.

George W. Jones, former president of the Star Coal and Coke Company and director of Amherst Fuel Company, died on August 9 at his home at Red Star, W. Va., at the age of 80. He was also president of the Logan County Coal Corporation prior to his retirement in 1926, following 34 years' activity in the coal industry since opening the Red Star mine, his first venture, in 1893.

William Beckley Gown, of New York, died on August 29 at Lake Placid, N. Y. He was long associated with the late William A. Clark, of Montana, as general auditor and accountant, and was comptroller of the United Verde Copper Company until his retirement, about six years ago.

John E. Hodge, well-known mining engineer, died in Los Angeles September 22 at the age of 77. Mr. Hodge was associated for many years with the E. J. Longyear Company in Minneapolis, and later on was prominent in mining association work in Los Angeles. He was president of John Elliott Hodge, Inc., and trustee of the Standard Metals Corporation.

Andrew W. Mellon, world famous industrialist and banker, died August 26 in Southampton, N. Y., at the age of 82. Secretary of the Treasury for 11 years under three Presidents, Harding, Coolidge, and Hoover, Mr. Mellon also served as Ambassador to Great Britain in 1932. Best known industrially, perhaps, for his development of the aluminum industry, he was also prominent in the oil and coal industries.

The bulk of his large personal fortune was left to an educational and charitable trust fund.

With the Manufacturer

Bucyrus-Erie Bulletins

Bucyrus-Erie Company, South Milwaukee, Wis., has recently issued 12 attractive new bulletins describing in detail different types of scrapers, bulldozers, bullgraders, shovels, draglines, clamshells, cranes, dragshovels, skimmers, blast-hole drills, and trailers included in their list of products. Copies may be obtained by addressing a request to any of the company's sales offices.

Light Air-Driven Core Drill

Features of the Longyear Junior Air Diamond Core Drill are described in bulletin 50, just released by E. J. Longyear Company, Minneapolis, Minn. Designed for underground drilling and particularly useful where working space is limited, the drill weighs only 370 lb. without the double column mounting, which weighs 140 lb. It has a capacity of 500 ft., recovering core $\frac{1}{2}$ in. in diameter.

Mine Car Couplers

Increased safety and efficiency in the handling of mine cars are perhaps the two most important advantages of the new O-B Automatic Mine Car Couplers, designed and manufactured by the Ohio Brass Company, Mansfield, Ohio.

Made of high-grade cast steel, the coupler bodies are equipped with heavy draft springs which absorb coupling shocks and provide for easy riding of the trip, an important consideration when contemplating maintenance budgets.

The coupling operation is completely automatic so that trips may be made up by simply bumping the cars together. It is not necessary for a workman to step or reach between the cars when either coupling or uncoupling. As the coupler heads come together, a spring-actuated cam on the female head engages a recess in the male head. Uncoupling is accomplished by merely raising a lever at the top of the car, which in turn releases the cam.

When conditions require it, the couplers can be set in an unlocked position so as to kick cars from dumps without performing their automatic coupling operation. Furthermore, the couplers

are made so that they will rotate and can therefore be used without uncoupling in rotary dumps.

When uncoupled, the couplers are always held in longitudinal center alignment by means of a combination spring suspension and centering device. The width of the heads provides sufficient gathering range so that coupling can be accomplished automatically on short radius curves without the adjustment of any parts.

Trains coupled with these O-B couplers become practically rigid units from end



O-B mine car couplers about to be coupled. Indicates the manner in which they engage on curves.

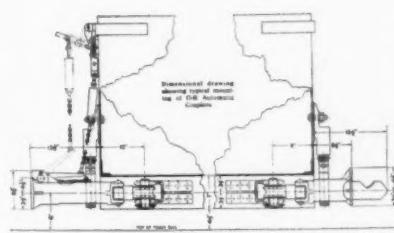
to end with the exception of the travel which is permitted by the draft spring. This is of special importance in the elimination of maintenance expense because cars are relieved from severe shock imposed by present practices. In the event of a derailment, this rigidity prevents telescoping or the riding of one car over another.

The tendency of the couplers at all times is to keep the train in proper tandem alignment whether on or off the track. The smooth riding which accompanies tight coupling and the cushioning effect of the draft springs means less loss of load and cleaner tracks. There is likewise less chance of derailment on curves, as the point of engagement is back of the bumper and near the center of the car. This smooth riding also eliminates shock to motor equipment. Furthermore, the rigid connections practically eliminate slack between cars so that motors are relieved from strain when trips are started.

Fast Mine Hoist to Be Driven by G-E Equipment

General Electric is building electric equipment for the largest and probably the fastest a.c. mine hoist in America. It will be installed at the Wenonah No. 9 mine of the Tennessee Coal, Iron & Railroad Company.

More than 6,000 ft. of wire rope will be wound around the 18-ft. drum in hoisting the unbalanced load of 50,800 lb. This enormous load will travel up the steep slope at a speed of 3,600 ft. per minute, or approximately 41 miles an hour. Only 10 seconds will be consumed in loading or unloading the car.



Typical installation of O-B automatic mine car couplers.

The G-E hoist motor is rated 2,500 hp., and the control is reversible, full magnetic. Dynamic braking will be used to reduce the speed when men are being hoisted. The resistor alone will weigh approximately 30,000 lb.

The Tennessee Coal, Iron & Railroad Company has also had in operation for a number of years three similar hoist equipments, which operate at a rope speed of 2,700 ft. per minute. These also are driven by G-E motors.

Welded Piping Systems

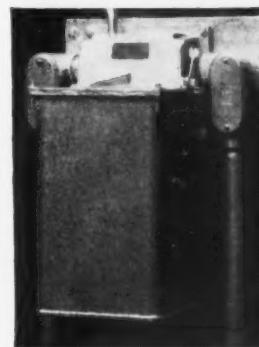
The advantages of welded joints in installing piping systems are discussed in "Welded Piping," a 12-page, illustrated booklet, published by the Linde Air Products Company, New York.

Subjects of particular interest to builders, architects and engineers are treated in sections on: pipe and services to be welded; lighter than standard weight pipe; fast, economical welding methods; layout, drawings and specifications; welded joints and fittings; plan of construction; shop and field fabrication, and piping erection.

Oil Immersed Low Voltage Lonestarters

New Westinghouse totally oil immersed starters known as low voltage type DNO, explosion-proof and corrosion-resisting service, are designed for starting squirrel cage motors in oil refineries, chemical plants, paper mills, coke plants, cement mills, and in similar applications where either corrosive or explosive gases may be present.

The combination starters provide in one oil tank complete corrosion-resisting motor control, motor disconnect switch and circuit protective device. Explosion-proof starters conform to the Underwriters' Laboratories specifications for



apparatus for installation in Class I, Group D, hazardous locations as defined in Article 32 of the National Electrical Code.

The line starters are of weather-proof,

drip-proof, splash-proof, dust tight construction with cast iron top casting and heavy sheet steel tank with gasketed joint. They are designed for wall or frame mounting, with tapped holes for conduits on top. Ends and back of top casting may be tapped for conduit.

Overload protection is provided by two thermal induction oil-immersed automatic reset overload relays.

Low voltage protection is obtained with three-wire push button control.

Complete safety is assured by interlocking breaker handle with the tank so that the latter cannot be lowered unless the breaker handle is in the "off" position. Furthermore, the breaker cannot be closed with tank lowered unless the interlock is deliberately tripped.

In addition to the breaker and starter combination unit described above, there is also available a combination unit with non-automatic disconnect switch and a plain starter without disconnect.

New Linde Sales Office

The Linde Air Products Company, unit of Union Carbide and Carbon Corporation, has opened a new sales office in Oakland, Calif., at 3710 San Pablo Avenue. The opening of this new office on September 1, 1937, brought the number of Linde offices throughout the country to a total of 33. This office will serve the Oakland area, supplementing the San Francisco office.

New Drifter Drill

Ingersoll-Rand Company, 11 Broadway, New York, N. Y., has recently introduced a new drifter drill called the DA-30. It is in the 125 lb. class, and is ideal for many mining operations such as small drifts, tunnels and stopes. A new double-opening valve has greatly increased the drilling speed without increasing the air consumption.



The DA-30 with
Auto-feed and Jackbits

This new drill has proved to be equally as popular as its bigger brother, the DA-35, which was introduced in 1936. Further details are shown in Form 2359, copies of which can be obtained by writing any of the company's offices.

McNally-Pittsburg Catalog

"The March with Time, Progress and Profits" is the title of the attractive and informative catalog No. 637 just issued by the McNally-Pittsburg Manufacturing Corporation, 307 N. Michigan Avenue, Chicago, Ill. Profusely illustrated with excellent cuts, the 80-page book pre-

sents brief descriptions of 22 recent preparation plant installations, followed by detailed accounts of the many types of preparation equipment listed among the company's products.

Friction Clutch Catalog

A 16-page illustrated list-price catalog No. 1532, on friction clutches, has been completed by Link-Belt Company, Chicago, Philadelphia, San Francisco, and is now available for distribution.

Besides giving sizes, dimensions, weights, horsepower ratings, and other pertinent tabular data on both Meesoco and Twyncone types of clutches, the book devotes two pages to the subject of how to select and order the right clutch for the service.

To obtain a copy, address the nearest Link-Belt office, asking for Book No. 1532.

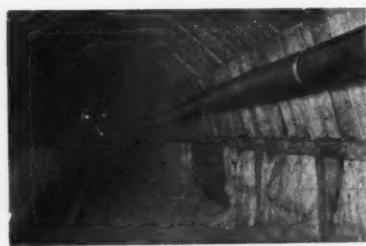
Turbo-Generator Units Described

Allis-Chalmers Manufacturing Company, Milwaukee, Wis., announces a new bulletin, No. 1180, covering condensing reaction type turbo-generator units of 1,500 k.w. to 5,000 k.w. capacity. This bulletin of 28 pages treats both turbine and generator construction in considerable detail. Photographs and drawings illustrate separation of oil and steam piping to eliminate possibility of oil fires, new combined journal and Kingsbury thrust bearing, separate steam chest, four bearing construction and simplicity of the governing system.

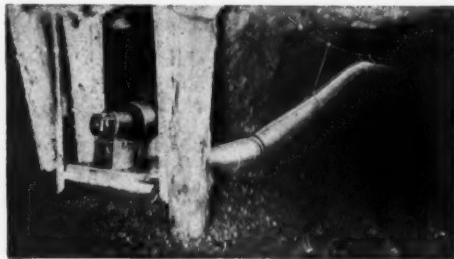
Practical and Efficient Mine Ventilation "MINE VENT"

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"MINE VENT" No. 11—waterproof and airtight, should be used near the surface where the water encountered is not highly acid and for temporary work. For lower levels "MINE VENT" No. 14 has proved highly satisfactory because it is resistant to acid mine water, fungi, and powder fumes. This is airtight and waterproof and made up on a tough jute base high in tensile strength. "MINE VENT" No. 15 is used in the deeper metal mines where extreme conditions necessitate a very durable cloth treated to resist high humidity, vitiated air, fungi, and acid mine water.



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New Circuit Breaker Standards

The National Electrical Manufacturers Association announces the release of a new standard. This pamphlet entitled "NEMA Large Air Circuit Breaker Standards, Publication No. 37-43" concerns the rating, performance and manufacture of large air circuit breakers. This material supersedes that which appeared in the NEMA Switchgear Standards, Publication No. 31-10, which was released in 1931. The publication contains all the ampere ratings, voltage ratings, mountings, definitions, etc., that have been set up by the association.

Copies of the publication may be obtained from the National Electrical Manufacturers Association, 155 E. 44th Street, New York, N. Y., for 75 cents a copy.

Revised Hard-Facing Booklet

A new and more complete edition of the booklet, "Hard-Facing With Haynes Stellite Products," is now being issued by Haynes Stellite Company, Kokomo, Ind., a unit of Union Carbide and Carbon Corporation. This booklet describes well over 500 money-saving applications of the hard-facing process.

This new edition is the fourth printing since the booklet was originally published a little more than three years ago. Over 35,000 copies have already been distributed. New sections present information concerning special Haynes Stellite J-Metal cutting tools and an improved welding technique for fabrication of equipment employing the corrosion-resistant Hastelloy alloys. A number of examples of hard-facing automotive and aircraft valves and valve seat inserts, and the use of Haynes Stellite trim for high-temperature, high-pressure steam valves, are now also described in detail.

Copies are available without obligation from Haynes Stellite Company, Kokomo, Ind.

Pipe Repair Handbook

Engineers, superintendents and maintenance men responsible for pipe line maintenance will be interested in the new "Pipe Repair Handbook," published by M. B. Skinner Co., South Bend, Ind. It discusses all the various kinds of leaks in pipe lines—holes, splits, pitted or corroded sections; and joints of various kinds, such as threaded joints, bell and spigot joints, welded joints, collars, etc., and discloses how repairs may be made without service interruption. The handbook is furnished without cost to men responsible for pipe maintenance.

Roots-Connersville Appoints Representatives

Recent appointments of zone representatives have just been announced by J. B. Trotman, manager turbine pump division of the Roots-Connersville Blower Corp., Connersville, Ind.

W. E. Burke, 24 Tolman Street, Waltham, Mass., will cover all of the New England States, promoting sales to mill supply and plumbing supply jobbers. Mr.

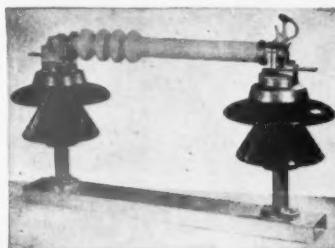
Burke's background includes several years in the pump field as New England manager for Goulds Pumps, Inc. More recently he has been associated with a long-established jobbing house in Boston specializing on pumps.

Warren E. Quillman, 1411 Surrey Lane, Overbrook Hills, Philadelphia, Pa., has been assigned the states of Virginia, Delaware, and Maryland, the southern half of New Jersey, and the eastern half of Pennsylvania. Mr. Quillman has also had a great deal of experience in the jobbing business.

Roots-Connersville manufactures a complete line of turbine pumps for industrial applications, as well as water systems, condensate return units, boiler feed pumps, etc. The company claims that its product permits handling small to medium capacities at high heads without the cost and complication of multistaging. Capacities range from 5 to 200 g.p.m. at heads up to 700 ft. Pumps run at standard motor speeds of 1,750 or 3,450 r.p.m., and are built in bronze-fitted, all-bronze, and all-iron constructions.

New "De-ion" Power Fuse

For service in medium capacity generating stations and substations of all types, where the short circuit capacity does not exceed 600,000 3-phase kv-a, a new 34.5 kv., 200 ampere disconnecting type BA "De-ion" power fuse is announced by the Westinghouse Electric & Manufacturing Company. This lightweight fuse can readily be lowered to the ground for inspection or refilling. The complete operation of removing the fuse from service, refilling, and restoring



service, can be accomplished in less than one minute's time, which is of initial importance in cutting down outage time and loss of revenue.

The fuse is hinged at the lower contact to open approximately 75 degrees, for use as a disconnecting switch that can be operated by a standard hookstick. Magnetizing currents of a 750 kv-a., 3 phase transformer are easily interrupted, using this fuse as a disconnect.

As with previously developed "De-ion" fuses, only inexpensive refills need be stocked for replacement. Even this has been greatly simplified, by packing every refill with an individual refilling tool, and simple pictorial instructions in a clearly labeled, moisture-proof metal container.

Blade Grader

A new model No. 33 blade grader has been announced by Caterpillar Tractor Co. This machine, equipped with standard 8-ft. blade weighs 5,900 lbs., and is similar in general design to the "Caterpillar" No. 44 and No. 66 graders recently added to the line.

The machine offers unusual flexibility and rapidity of blade movement. The blade can be moved from a ditching to a high bank cutting position without offsetting the blade on the beams or making any changes in the supporting links. It is not necessary for the operator to leave his platform or stop the tractor.

The No. 33 grader is best suited to the "Caterpillar" Diesel RD4 tractor or other tractors of approximately 35 drawbar horsepower.

Sullivan Appoints Spain

Gail E. Spain, formerly assistant sales manager of Caterpillar Tractor Company, has been appointed general manager of the Rock Handling Division, Sullivan Machinery Company. Mr. Spain will be in direct charge of domestic sales offices handling rock drills, portable air compressors, mining and industrial hoists and, in addition thereto, will be responsible for all activities of the Rock Handling Division, including manufacturing and engineering. Mr. Spain will make his headquarters at Claremont, N. H.

MSA H-H Inhalators

In a new bulletin just off the press, the Mine Safety Appliances Company, Braddock, Thomas and Meade Streets, Pittsburgh, Pa., describe their H-H inhalator, used universally in the successful resuscitation of victims of carbon monoxide poisoning, gas asphyxia, electric shock, drowning, acute alcoholic intoxication, morphine narcosis, asphyxia in the new born, and in the supportive treatment of pneumonia.

Copies of this informative and instructive new bulletin are available either by writing this magazine, or by addressing the manufacturer direct.

Drill Steels

SKF Steels, Inc., has just released a new and very unusual catalog on drill steels. It is a practical book written for practical men, containing a vast amount of authoritative data, gathered from many sources. This material is presented in a non-technical style and contains many pointers for both users and buyers of rock drill steel.

By reason of its intimate contact and many years experience in the field involving rock drills and steel problems, SKF has been able to make this book different and very informative. Striking close-ups of the Mt. Rushmore Memorial are a feature.

A free copy may be obtained upon request, from SKF Steels, Inc., 369 Lexington Avenue, New York, N. Y.

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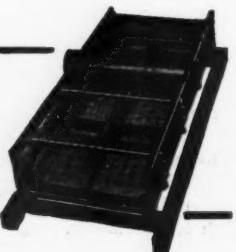
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